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BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY)

BRITISH MUSEUM
22 FEB 1971
NATURAL HISTORY

ENTOMOLOGY

Vol. XXIV

1969—1970

BRITISH MUSEUM (NATURAL HISTORY)
LONDON: 1971

DATES OF PUBLICATION OF THE PARTS

No. 1	13 June 1969
No. 2	3 December 1969
No. 3	3 December 1969
No. 4	22 January 1970
No. 5	30 January 1970
No. 6	30 January 1970
No. 7	27 May 1970
No. 8	27 May 1970
No. 9	24 July 1970

Printed in England by Staples Printers Limited at their Kettering, Northants, establishment

BRITISH MUSEUM
2 FEB 1971
NATURAL HISTORY

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A KEY TO THE GENERA OF THE MENOPONIDAE (AMBLYCERA: MALLOPHAGA: INSECTA)

THERESA CLAY

BRITISH MUSEUM
10 JUN 1969
NATURAL HISTORY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 1
LONDON: 1969

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BY

THERESA CLAY

British Museum (Natural History)

Pp. 1–26; 7 *Plates,* 29 *Text-figures*

BRITISH MUSEUM
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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

In 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

This paper is Vol. 24, *No.* 1 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

World List abbreviation :
Bull. Br. Mus. nat. Hist. (Ent).

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 13 *June*, 1969 *Price* £1 1s.

A KEY TO THE GENERA OF THE MENOPONIDAE (AMBLYCERA : MALLOPHGA : INSECTA)

By THERESA CLAY

SYNOPSIS

A review of the characters which have been used in the diagnosis of the genera of the Menoponidae is given, together with a number not previously used. A discussion of their taxonomic value is included, followed by a key to the genera and subgenera of the family.

PART I

INTRODUCTION

In formulating a key to the genera of the Menoponidae an attempt has been made to use characters which not only define each genus but also place at least some of the genera in larger groupings; these may prove in some cases to be phylogenetic. The greater number of species now available has shown that many of the former key characters cannot always be used or have only a limited application. These include presence or absence of postpalpal and anteroventral head processes; ctenidia on the 3rd femur and sternites; asters of spiniform setae on sternite II of *Myrsidea*; subdivisions of the flagellum; number of prosternal setae; shape of head and abdomen; the characters of the dorsolateral margin of the head and hypopharyngeal sclerites. These characters may vary within groups of otherwise similar species or may be common to otherwise dissimilar genera. It is hoped that this key may give a clearer conception of the generic characters and their reliability in the taxonomy of the family. Only those structures of ectodermal origin and which can be seen satisfactorily without sections have been considered; the task of sectioning and examining a sufficient number of specimens of each genus would have been impossible and a number of the genera are represented only by specimens mounted on slides. Some characters have obviously been missed; also omitted are those which could not be seen clearly in all the available material or the morphology of which could not be correctly interpreted. There are also other characters which need further material and time for study, such as the segments and sensilla of the flagellum.

There follows a review of the characters of various parts of the body with a discussion of their taxonomic importance. These characters fall into four groups: those which are found throughout the Menoponidae and which are of little interest here, but are mentioned when they have been or might be included in generic descriptions; those which vary throughout a genus and are of specific value only; those which can be used for generic separation; and those which group similar genera together. The same character can of course be specific in one group and generic in another. Two cases have been found in which a character, apparently unique for the Amblycera, is of no more than specific or of species-group value (see *Comatomenopon elbeli* Emerson abdomen and *Meromenopon* head setae). It is appreciated that the term 'generic character' is not very meaningful considering how the generic concept differs among workers on Mallophaga at the present time; elsewhere (Clay, 1947 : 457–477; 1951 : 171–175; 1953 : 581; 1966 : 332–333) the present writer's views on the genus have been made clear and need not be repeated. It is felt that at present there is little to be gained by attempting to group the genera into various families and other divisions.

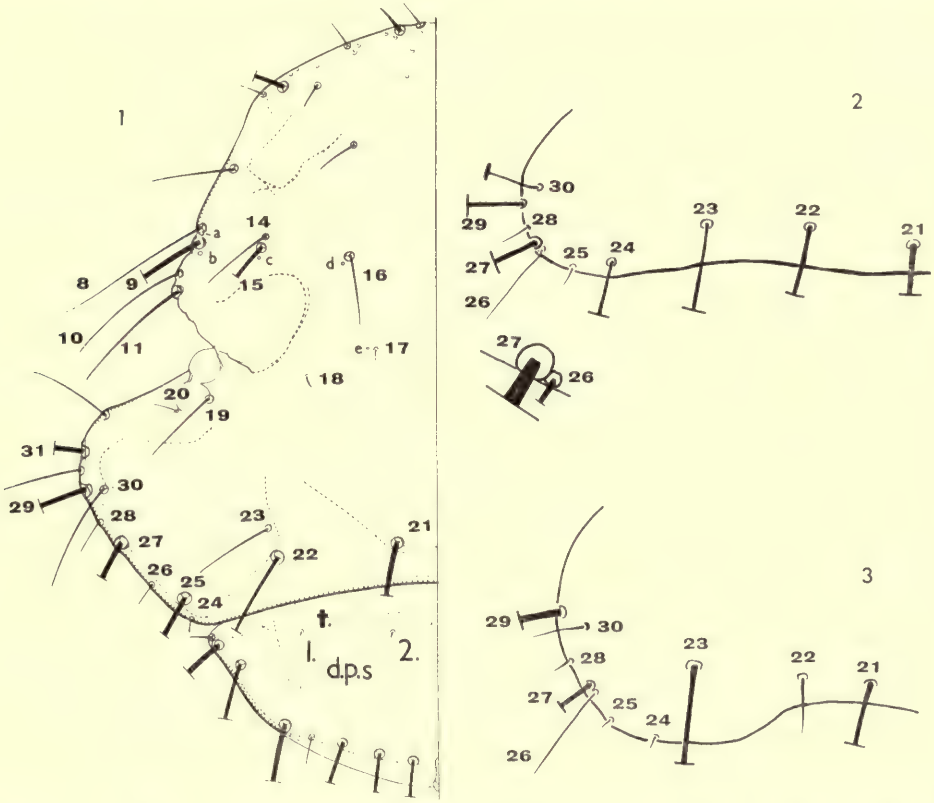
Head

1. *The Head Capsule.* The basic structure of the head is similar throughout the Menoponidae (Buckup, 1959; Haub, 1967), but the form of the dorsolateral margin (Text-fig. 4) and its junction with the temple margin, the presence or absence of a preocular notch or slit, position of the eyes and the form of the antennary fossa provide useful generic characters. The presence or absence of a narrow preocular slit is usually constant in a group of otherwise similar species, but in *Menopon* there is variation from a deep narrow slit (*M. interpositum* Ansari) to a shallow narrow slit (*M. gallinae*) to an approximately straight margin (*M. jellisoni* Emerson). *M. interpositum*, for instance, with the abdominal characters typical of *Menopon* has the dorsolateral margin of the head similar to that of *Amyrsidea perdicis*. Variously developed ventral sclerotized processes arising near the anterolateral margin may be present or absent (e.g. *Pacifimenopon* Price) or occasionally present in genera in which such processes are not usually found (e.g. *Machaerilaemus raggianae* Price & Emerson, *Kurodaia quatei* Price); they are probably of little phylogenetic value. Processes arising near the base of the maxillary palp (postpalpal processes, Text-fig. 5) are usually more constant within genera, but may be present or absent in *Nosopon* and *Pseudomenopon*, for example; in the latter genus and in *Colimenopon* they may be present in the nymph and absent in the adult; it is also doubtful whether their presence or absence forms good generic characters for some of the species infesting the Galliformes. The presence of these processes is therefore only specific in some genera, but in others is probably generic (e.g. *Kelerimenopon*, *Apterygon* Clay and *Hohorstiella*). The gular region has two or more setae each side and may or may not have a well-sclerotized plate; the form of this plate is a generic character in *Pseudomenopon* and *Colimenopon*.

The tentorium has been described by Symmons (1952 : 365) who showed its similarity in the species of Menoponidae she examined belonging to the genera *Colpocephalum*, *Menopon*, *Menacanthus*, *Myrsidea* and *Ancistrona*. In mounted specimens it is generally possible to see the anterior and posterior pits, the anterior tentorial arms and the tentorial bridge; differences are shown in the width of the bridge relative to the size of the head and the size of the posterior pits, but it is doubtful whether these will provide useful characters for the recognition of genera. In *Eureum* and *Dennyus* the bridge is narrowed centrally, but in some species this tends to be rather wider and would probably grade into that of some species of *Myrsidea*, for instance, which is broader than is usual in *Dennyus* but less broad than in some species of other genera. Symmons (1952 : 375) showed that there were some differences in the tentorium of *Trinoton*, mainly of muscle attachments, and of *Piagetiella*, in which parts of the bridge and anterior arms are difficult to see owing to some lack of sclerotization and to the heavy sclerotization of parts of the head.

The degree of pigmentation of the internal carinae gives a characteristic appearance to the head and may be correlated with other characters to help in generic groupings. However, it seems to be a rather variable character; the quill-inhabiting species, for instance, having a tendency to lighter pigmentation (e.g. *Comatomenopon*).

2. *The Head Setae and Sensilla.* These tend to form constant patterns (Clay, 1960 : 573) and the dorsal head setae expecially may be useful for the recognition of genera and generic groupings. They have been used extensively in the key, being referred to by numbers e.g. seta 23; those of taxonomic importance have been labelled in Text-figs. 1–4. On the anterior region of the dorsum there may be extra setae in some species of a genus or in one sex only and the setae of this region have not therefore been used. The lengths of 10 and 11 (the preocular setae) are useful specific characters; the addition of one or more setae to this pair may be specific (*Actornithophilus crinitus* Clay) or generic (*Meromenopon*). *Ancistrona* has a row of fine setae along the inner dorsolateral margin (Text-fig. 20) not seen in any other



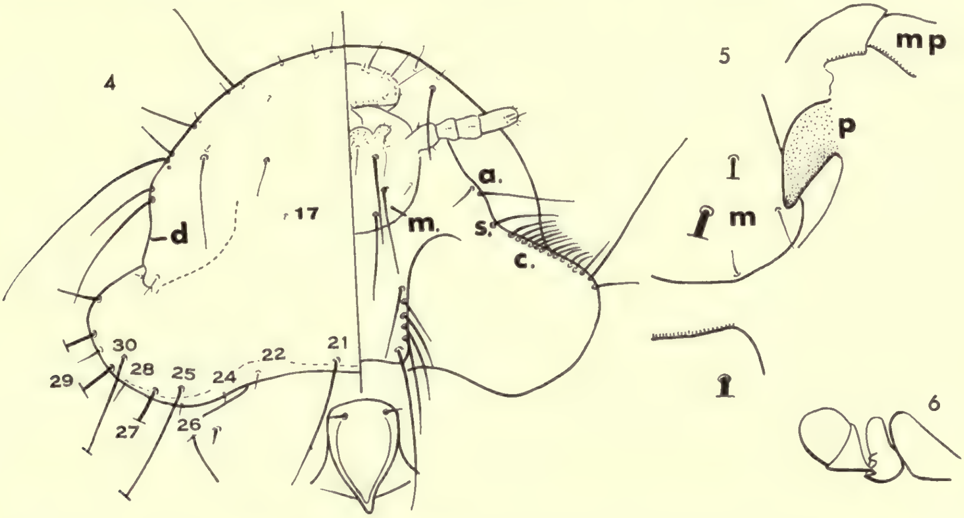
FIGS. 1–3. 1, Menoponidae head (dorsal) and pronotum, 2–3, Posterior part of dorsum of head. 2, *Menacanthus stramineus*. 3, *Colpocephalum* sp. *a–e*. dorsal head sensilla; 8–31. dorsal head setae; *d.p.s.* central pronotal setae 1–2; *t. transverse* pronotal carina.

genus. Numbers 14–16 (setal complex and dorsal seta of Price & Beer, 1963 : 851) usually form a characteristic group, their position in relation to each other often being of specific importance. The size and position of 17 and 18 (the mid-dorsal head setae) may form generic (*Cuculiphilus*) or specific characters (e.g. *Colpocephalum*); the absence of 18 is a generic character in *Myrsidea*. The two ocular setae (19 and 20) seem to be always present: 19 usually lies near the division of the two ommatidia (when apparent); 20 is usually small and often marginal and difficult to see; in *Dicteisia* it is well developed (Price, 1968). The posterior marginal or submarginal temporal and occipital setae are numbered from the centre outwards as the first ten form useful taxonomic characters, whereas the anterior temporal setae are not always constant in number, and in mounted specimens may get confused with the ventral. The occipital setae (21–22) are always present and their relative length and thickness may form specific or generic characters. Seta 23 may lie anterior or anterolateral to 22 (Text-fig. 1) or in a straight line with 21 and 22 (Text-figs. 2–3), often some considerable distance across the temple; it is important to identify it correctly and not confuse it with 24 or 25. In *Myrsidea* seta 23 is always absent and in *Bucerophagus* it may be minute. Of the seven following marginal or submarginal setae (24–30), 29 and 30 in nearly all species can be recognized as 30 lies near and submarginal to 29, either being on the outer or on the mediad side; in *Trinoton* it is nearer seta 27; in *Numidicola* it is marginal. The next marginal seta is 28, usually short and fine; followed by 27 and 26 which are either separated or have their alveoli contiguous or nearly contiguous; in this last condition 26 is usually fine and significantly shorter than 27. The position of these two setae is a constant feature within genera and groups of genera and is a useful key character. However, it does separate *Bucerophagus*, in which 26 and 27 are closely associated, from the otherwise similar genera *Chapinia* and *Bucerocolpocephalum* Elbel in which they are not. This leaves two setae, 25 and 24, one or both of which may be minute to medium to very long; the length of these setae may be a useful character, but in *Machaerilaemus* one or both may be missing and in other genera the lengths may vary. In those species with one long and two short setae between 23 and 27 (Text-fig. 1) it is not always possible to number the long seta; it is usually submarginal to the two short marginal setae and may vary in its position relative to them. *Ancistrona* has extra setae: three long and two short between 23 and 28. In addition to these temporal setae, one of the setae anterior to 30 (here called 31) may be long and stout. The number of long setae may be generic (three in *Eomenopon*) or specific (two or three in *Kurodaia*, Price & Beer, 1963 : 851). The lengths of the head setae are not always key characters owing to the known and potential variation and to the subjective interpretation of ' long ' and ' short '.

The dorsal head sensilla may be five in number (Text-fig. 1), but there are more usually three: *a.* is not always apparent as it lies on the margin just anterior to seta 9; *b.* just posterior to 9 is useful for the identification of this seta; *c.* is usually present and associated with setae 14 and 15; *d.* associated with seta 16 and *e.* with 17 are less commonly present. The presence or absence of *e.* is a group character in *Austromenopon*, being present only in the species infesting the Alcidae; *d.* is absent in *Actornithophilus* species from the Lari, being present in species from other hosts; in

Menacanthus from the Galliformes *d.* may be present or absent in different species. The absence of *c.* may be a generic or group character: in the *Colpocephalum*-complex *c.* is usually present, but appears to be absent in the species infesting the Galliformes and in a few of those on the Ciconiiformes.

The ventral head setae are mainly constant in number and position throughout the Menoponidae. The labral setae comprise a posterior row of usually closely arranged setae and an anterior row often with 1, 3, 6 and 7 short and the remainder longer (Text-fig. 4). An examination of many species, however, shows that there is no clear distinction between ' long ' and ' short ' setae and there are many exceptions. This is not therefore usually a useful character, but in *Ancistrona* these setae are diagnostic, being all minute with the exception of one long seta each side. In all species examined there are two setae, one long and one short, at the anterior end of the ventrolateral margin (Text-fig. 4 *a* .), posterior to these are one or more setae (*s.* subocular setae, Ryan & Price, in press), followed in most genera by the subocular comb row (= lateroventral head fringe, Clay 1966 : 330). The first or only seta in group *s.* is frequently elongate and sometimes flattened and somewhat hyaline (e.g. *Eidmanniella*; Pl. 4, fig. 20); in *Meromenopon* from the Meropidae this seta is flanged with at least one tooth (Pl. 3, figs. 15–16), being unlike any other seta seen in the Mallophaga; in the congeneric species from the Coraciidae the seta is normal. The presence of only one seta in group *s.* may be a specific or generic character; in *Eomenopon* and *Pacifimenopon* the elongate seta may not be the most anterior one. In some cases it is not always possible to separate some of the setae of group *s.* from the comb row. The subocular comb row (Pl. 4, fig. 19) is characteristic of the



FIGS. 4–6. 4, *Myrsidea* sp. head: *m.* 3 postmental setae; *a.* the 2 anterior subocular setae; *s.* subocular seta; *c.* subocular comb row; *d.* dorsolateral margin of head. 5, *Menacanthus stramineus*: part of venter of head; *m.* 4 postmental setae; *mp.* base of maxillary palp; *p.* postpalpal process. 6, *Trinoton* sp. antenna.

Menoponidae, but is absent or atypical in *Microctenia*, *Machaerilaemus* and *Ancistrona*; in the latter genus its function may have been taken over by the row of setae along the inner edge of the dorsolateral margin. In some genera (e.g. *Colpocephalum*) there is a ventral patch or line of submarginal setae on the anterior region of the temple (Pl. 4, fig. 21); this should not be confused with the subocular comb row and the seta continuous with this row which in mounted specimens may appear submarginal. In *Kelerimenopon* a band of thickening runs inwards from the ventrolateral margin with at least one seta. The histology of the setae and integument of the Menoponidae is discussed by Neuffer, 1954.

3. *The Antenna*. In all Menoponidae the antenna (Pl. 1, fig. 1) comprises the scape, pedicel and a flagellum of usually two segments, the terminal one sometimes being subdivided. The distal anterior angle of the scape and pedicel may be produced laterally (*Trinoton*) or the pedicel alone (*Mimemamenopon* Carriker) forming generic characters; the latter condition may also be only specific (*Ciconiphilus*, *Hohorstiella*). In one species of *Eidmanniella* three of the distal setae of the pedicel are broad and hyaline (Ryan & Price, in press). The first segment of the flagellum is always pedunculate or wineglass-shaped. Ferris (1923 : 57) discussing *Menopon* and Tendeiro (1967 : 384) *Chapinia*, considered that this segment was divided into two, the first being small and formed by a line across the ' stalk ', the part proximal to the line being darker in colour. This condition is apparent in many species belonging to many genera: in *Bucerophagus productus* there is no sign of an external structural division (Pl. 1, fig. 2) and no break of the internal marginal thickening; the apparent segmentation may be due only to the difference in pigmentation. In *Myrsidea cornicis* and *Pseudomenopon pilosum* in which this line is apparent, reconstructions of the antennae from sections by Buckup (1959) and Haub (1967) show no break in the pedunculate segment, these authors describing it as a single segment. It would therefore be more satisfactory to treat it as such. Kéler (1958 : 82) in the original description of *Eidmanniella* stated that the antenna appeared three-segmented as there was only a trace of the line of division between the two segments of the flagellum; stereoscan photographs of this type of antenna (Pl. 1, fig. 4) show a definite division, but perhaps not so marked as in some other species (Pl. 3, figs. 13–14). The second segment of the flagellum, usually referred to as the terminal antennal segment, may be globose to elongate, the shape frequently being similar in the species of a genus. The surface of this segment is ridged (Pl. 2, figs. 7–12) and it is these ridges when deep and in a straight line which may give a false impression of a subdivision of the segment. It is possible that the form of these ridges and the sculpturing of their edges (Pl. 1, fig. 3) may provide further taxonomic characters. The distance apart of the ridges, visible with the light microscope, has been used in the key to separate two groups (Pl. 3, figs. 13–14). The form of the sculpturing of the third segment may also prove to be a taxonomic character. Distally there are a number of setae, sometimes cone-shaped (Pl. 3, fig. 13) and two sensilla which seem to be sensilla coeloconica (Pl. 3, fig. 13; Pl. 7, fig. 42). In species with the last segment subdivided, one of these sensilla is proximal to or near the dividing line (*Cuculiphilus*, Pl. 1, fig. 3), suggesting that the primitive condition may have been a three-segmented flagellum with a sensillum on each of the two terminal segments. Whether the last

segment is subdivided or not has frequently been used as a generic character, but it now appears that this may not always be reliable. In *Cuculiphilus* there is a well marked division internally and externally (Pl. 1, fig. 3). In *Bucerophagus productus* there is an internal break in the marginal thickening and the part proximal to this is slightly more darkly pigmented, but externally there is no definite division (Pl. 1, fig. 1); one of the sensilla lies proximal to the internal division. Some species of *Menacanthus* also show a break in the internal marginal thickening of the terminal segment without any other indication of a division, so that the presence or absence of an internal break may not be relevant. It would seem that in *B. productus* the appearance of a division is partly due to the slight change in pigmentation and partly to a deep furrow between the ridges (Pl. 2, figs. 7–9). In *B. africanus* similar photographs (Pl. 2, figs. 10, 12) suggest that there is a definite division; there is also a marked difference in pigmentation in this species, the part proximal to the line of division being darker in colour. This segment in some species of *Colpocephalum* resembles that of *B. productus* in having the proximal part more darkly pigmented and the two sensilla widely separated. In *Plegadiphilus* the presence of a subdivided terminal antennal segment has again been incorrectly used as a generic character (Clay, 1947; Blagoveshtschensky, 1964). In some species of this genus the pigmentation and the ridges, together with the position of the proximal sensillum and an internal break in the marginal thickening, gives the impression of one or more subdivisions (Pl. 3, fig. 14). In *Plegadiphilus plegadis*, in which this segment is short there is no indication of a division and the two sensilla are close together. In *Austromenopon* one species (*A. affine*) shows internally and externally a line of division with the sensillum just proximal to the line, others show some indication of a line of division, while others show none. It is not possible therefore to use this character as a major division in the key.

A preliminary study of the position of the sensilla and their associated setae as possible generic characters has shown considerable variation within groups of otherwise similar species. In many species the two sensilla are near each other at the distal end of the segment and their surface apertures are similar; in *Bucerophagus* the two sensilla are widely separated and the proximal one lies in a circular pit (Pl. 2, fig. 11). *Menacanthus stramineus* has the terminal antennal segment (Pl. 3, fig. 13) typical of a number of species of *Menacanthus* from the Galliformes and Passeriformes; in this the distal sensillum is on the end surface of the segment with the majority of the setae, while the proximal is nearby with two or three setae which arise from a slight indentation. This differs from the elongated last antennal segment of *Menopon* and *Amyrsidea* in which there is no indentation and the two sensilla and the two lateral setae are close together on the end of the segment. However, other species of *Menacanthus* (that from *Arborophila*, for instance) in which the segment is elongate, the condition is similar to that of *Menopon*; and the *Menacanthus* from *Alectoris* in which the last segment is short, the sensilla are close together and the setae are merged with the group of terminal setae and no longer associated with one of the sensilla; this arrangement is also found in many of the species parasitic on the Passeriformes. Thus, the position of the sensilla is not necessarily dependent on the length of the segment; there is some indication that the wide separation of the sensilla is associated with a tendency in the group towards subdivision of the segment. In *Austromenopon* the proximal sensillum may be near the distal end or at various positions in the distal part of the segment, being found nearest the base in *A. affine*, in which it lies near the line of division. The species of this genus probably all have two of the stout setae placed near the middle of the lateral margin of the terminal segment. It is apparent from the above survey that these characters will not provide any major divisions for the key but further studies of all the antennal characters may reveal some patterns of taxonomic interest.

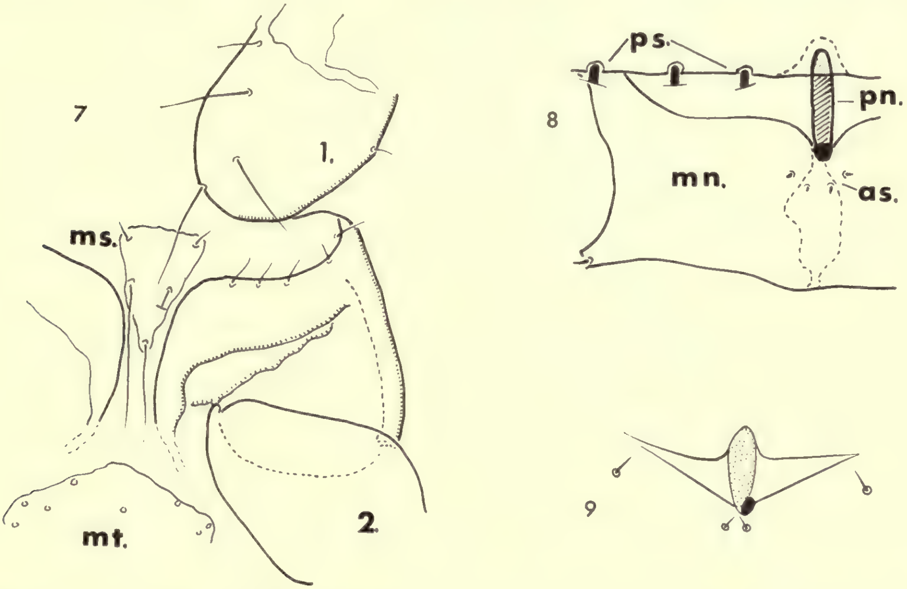
4. *Eyes*. Wundrig (1936) has shown that the Amblycera have two ommatidia each side and these show all stages from eyes with well-developed biconvex lenses (Pl. 1, fig. 6) to those with no lens. As it is doubtful whether without sections it is possible to state the exact stage of development of the ommatidia, the character of ' eyes present or absent ' has not been used. The lenses are usually located on the dorsolateral margin but in *Pseudomenopon* and part of *Eidmanniella* (new genus, Ryan & Price, in press and see Clay, 1957 : 143) the eyes are more towards the centre of the head (Pl. 1 fig. 5).

5. *Mouth Parts*. With the exception of the hypopharynx these are similar throughout the Menoponidae (Buckup, 1959; Haub, 1967). The maxillary palp is four-segmented, the last segment usually having two well-marked sub-terminal setae, the relative sizes of which may be a specific character (Clay, 1968, Pl. 1, figs. 6–7). The alveoli of these setae are usually contiguous, but may be separated by a definite gap, this appearing to be a constant character in *Dicteisia*, *Clayia* and *Somaphantus*; both conditions are found in species of *Menacanthus* parasitic on the Passeriformes. In some species these setae are not apparent and perhaps merge with the terminal setae; in *Cuculiphilus* sens. lat. there is a third seta associated with this pair (Pl. 7, fig. 45). Each labial palp has five anterior setae, in *Neomenopon* one is fine and not apparent in all specimens. The number of setae on the prementum appears to be constant; the lengths of one of these setae has been used as a species-group character in *Actornithophilus* (Clay, 1962 : 237). The postmentum usually has four setae each side; (Text-fig. 5); in a few genera (e.g. *Myrsidea*, Text-fig. 4) the most posterior seta each side is missing and in *Nosopon milvus* Tendeiro it is replaced by a clump of four to six small setae. The hypopharyngeal sclerites and the functionally associated epipharyngeal crest show various degrees of development which appear to be of little phylogenetic importance (Clay, 1962*b* : 220): otherwise similar species may have the sclerites well-developed or reduced (*Austromenopon*, Clay, 1959 : 159; *Myrsidea*, Clay, 1966, Pl. 2, figs. 1–2). In *Neomenopon* the form of the hypopharynx is unusual and may prove to be a good generic character. The distinctive epipharyngeal organs (Buckup, 1959 : 262) appear to be present in all the Menoponidae.

Thorax

Especial attention has been paid to the thorax and legs which provide many useful generic and subgeneric characters. A detailed study has been published by Mayer (1954) and only those characters of taxonomic value will be discussed here.

1. *Prothorax.* The transverse carina of the pronotum (Text-fig. 1) is apparent in all genera with the exception of *Rediella*; the vertical carina shows various stages of development. In some species there is a vertical groove each side of the pronotum giving the so-called ' winged ' or ' lobed ' prothorax. The postnotum (sens. Mayer, 1954 = mesonotum sens. Cope, 1941) in the majority of genera is a well pigmented oblong sclerite (Text-fig. 8), often distorted in mounted specimens; it may not be apparent (*Numidicola*) or it may be of a different shape (*Ancistrona*). The prosternal plate varies from being well developed to greatly reduced; in *Eidmanniella* a posterior process of the prosternal plate may be strongly or weakly sclerotized or absent. There are usually two pairs of central pronotal setae (dps) lying on or near the transverse carina, but in some species-groups (Clay, 1962 : 237) or genera (*Myrsidea*) they are reduced to one pair or absent. Although the number and lengths of the posterior marginal setae of the pronotum may be useful specific or species-group characters, they are not necessarily of generic importance. All species have two small central prosternal setae; additional setae may be of generic importance, but in some genera both conditions may be found (e.g. *Ciconiphilus, Clayia*).



FIGS. 7–9. 7, *Heleonomus* sp., mesothorax: 1, 1st coxa with the 5 posterior coxal setae 2, 2nd coxa; *ms.* mesosternal plate; *mt.* metasternal plate. 8, *Colpocephalum* sp., pronotal margin and mesonotum: *ps.* pronotal marginal setae; *pn.* postnotum; *mn.* mesonotum; *as.* anterior mesonotal setae. 9, *Actornithophilus* sp., postnotum and anterior mesonotal setae.

2. *Mesothorax.* The mesonotum is developed to a greater or lesser extent, the differences not being sufficiently clear cut to use as a generic character. There are two different types of mesosternum: in the majority of genera (Text-fig. 7) the sclerite (part of the episternum) bearing the inner articulation of the leg is separated

from that of the other side by a distinct mesosternal plate or by an area without a definite plate. In the other type (*Myrsidea, Cuculiphilus*) the mesonotum, pleura and mesosternum are fused to form a sclerotized ring round the body (Clay, 1966, Pl. 1, fig. 6). The anterior mesonotal setae may be four in number clustered round the distal end of the postnotum (Text-fig. 8); in some species of *Odoriphila* the setae of the pair each side of the postnotum lie close together and in some specimens one seta may be hidden below the other giving at low power the appearance of only two. Less commonly the outer setae may be widely separated from the inner (*Actornithophilus*, Text-fig. 9) or there may be only two (*Myrsidea*). These setae are constant in position and number within genera and form useful key characters. In addition, the mesonotum has at least one other seta each side, lateral or posterolateral to the anterior mesonotal setae, and it is important to identify these before deciding whether there are two anterior mesonotal setae or four widely spaced ones. The centre of the mesosternum usually has four or more setae, but in some genera there are only two (*Austromenopon*); this is usually a constant character within a genus or groups of genera but in *Bucerophagus* there may be two or more setae.

3. *Metathorax.* In *Myrsidea* some species may have the metanotum strongly modified while in other similar species it is normal, this character therefore seems to be of little phylogenetic importance (Clay, 1966 : 331). In *Clayia* and at least some species of *Menopon*, there is a variously developed central vertical line of thickening in the anterior part of the metanotum; however, some of the species of *Menopon* are based on specimens not in sufficiently good condition to say whether this thickening is present, but it may prove to be a good character for these two genera. The outer seta at each end of the posterior marginal or submarginal row of metanotal setae is long or the longest of the row; it is sometimes anterior to the rest of the row. The presence of many central setae on the metanotum may be a specific character (*Actornithophilus*). There is usually a central metasternal plate with setae.

The species of *Trinoton* have two large thoracic sternal plates with many setae; caudad to the posterior plate is a bilobed flap appearing white in untreated specimens (Pl. 5, fig. 25). Species of *Eureum* also have a white flap arising from what is probably the metasternum and a similar one on abdominal sternum I (Pl. 5, fig. 26) and in *Dennyus* on the metasternum and a number of the abdominal sterna. In *Trinoton* the surface sculpture (Pl. 5, figs. 28, 30) of the flap is similar in specimens parasitic on species belonging to five genera of the Anseriformes, but differs from that of the flaps in *Eureum* (Pl. 5, figs. 27, 29) and *Dennyus* (Pl. 3, fig. 17). The function of these areas is unknown. Species of *Trinoton* also have a conspicuous white area surrounding the gular plate (Pl. 5, fig. 25), but the surface sculpture is quite distinct from that of the metasternal flap (Pl. 3, fig. 18).

Legs

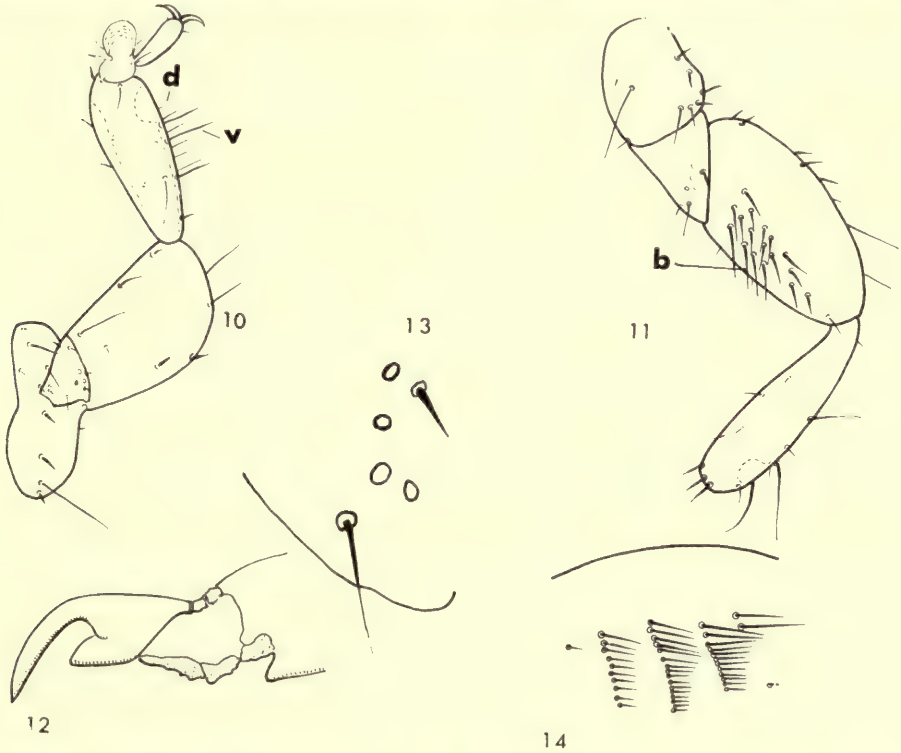
The gross morphology of the legs is similar throughout the Menoponidae (see Mayer, 1954).

1. *Coxa.* These are attached to the ventral part of the thorax except in those genera (e.g. *Trinoton, Eureum*) with wide sternal plates which cause the articulation

to be more lateral; in the former genus the usual anterior prolongation of the first coxa is greatly reduced. The first coxa frequently has four or five posterior setae (Text-fig. 7.), but in certain genera (*Austromenopon*) or groups of genera there are more; however some of the species may have only one or two extra setae with the occasional specimen without these (in *Eidmanniella*); this character cannot therefore always be used. Those species with many setae on coxa I may also have a greater number on II and III.

2. *Trochanter.* Ventrally there are a number of well marked sensilla associated with two setae (Text-fig. 13), the most usual number on legs II and III being four to five, but some genera (*Bonomiella*) or species-groups appear to have a constant number of three. The number is of doubtful general use in the key as it is sometimes only specific (*Nosopon*) or there is the occasional specimen in which it varies on different legs; however, in some species groups of *Menacanthus* (see below, p. 18) the number is correlated to a certain extent with other characters.

3. *Femur.* The most important taxonomic character of this segment is the ventral chaetotaxy of the third femur. This may be in the form of patches of irregularly arranged setae (brushes, Text-fig. 11) or regular rows of stout spine-like setae (combs



FIGS. 10–14. 10–11, Menoponidae legs. 10, 1st, ventral: *d.* 1st outer dorsolateral tibial seta; *v.* 2nd. outer ventrolateral tibial seta. 11, 3rd, ventral: *b.* brush of setae. 12, *Bonomiella* sp. claw. 13, Trochanter with ventral sensilla and setae. 14, Venter of 3rd femur with ctenidia.

or ctenidia, Text-fig. 14, Pl. 6, fig. 31) or a few scattered setae. The form tends to be constant throughout groups of otherwise similar species and frequently provides useful generic characters. The presence of ctenidia is a group character in the *Colpocephalum*-complex, but they are also found in other genera: *Bucerocolpocephalum* with ctenidia is otherwise similar to *Bucerophagus* and *Chapinia* without; in *Piagetiella* they may be present or absent in different species. *Microctenia*, in addition to a brush of setae, has the venter of the third femur covered with rows of comb-like outgrowths (Pl. 6, fig. 32).

4. *Tibia.* Here again the chaetotaxy shows good taxonomic characters: the number of outer dorsal setae may form useful specific characters (Clay, 1962 : 195; 1966 : 334, Text-fig. 10). Many species in which there are many outer dorsal setae on tibia I, have only a few on II and III (Text-fig. 11), while in others (*Colpocephalum*-complex) there are numerous marginal and submarginal setae in this position (Pl. 6, fig. 33). *Hoazineus* and *Heleonomus* (Pl. 6, fig. 34) have a row of short regular setae along the outer margin of I–III. In some genera the extra tibial setae may be present or absent (*Falcomenopon*, Emerson & Elbel and some species of *Kurodaia*) and in *Osborniella* the number of the tibial setae is fewer than in most species of the *Colpocephalum*-complex. There is considerable difference in the size and position of the terminal ventral tibial setae, but no clear distinctions could be found as they grade from relatively fine to thick spine-like setae and the distance between them shows all stages from two of the alveoli being contiguous to all four being widely spaced; it was decided that this is not a practical generic character. One genus (*Piagetiella*) has a tibial spur in the male.

5. *Tarsus.* Kéler (1952, 1955) and Mayer (1954) give descriptions of this joint in some species of the Menoponidae. The tarsus comprises two segments, the proximal being small and the distal being longer and of various proportions. The pretarsus bears two claws which articulate with the well-sclerotized unguifer; the shape of the claws may be diagnostic (*Bonomiella, Microctenia*). The unguitractor in the adult is in the form of two plates to which is attached the tendon-like apodeme of the retractor muscle of the claws, usually visible in specimens treated with KOH. Distally the dorsal part of the unguitractor may be elongated laterally forming two pointed processes (*Neomenopon, Hohorstiella*) or there may be a central comb-like area (*Bucerophagus*). Arising from the ventral part of the unguitractor on legs II and III is a hyaline, sometimes tuberculate process (Pl. 6, fig. 35), the empodium (sens. Kéler, 1952); the shape of this may be diagnostic (Clay, 1966); it may be small and is sometimes not apparent and perhaps absent. Owing to the difficulty of seeing its true form in mounted specimens, the empodium has not been used here as a taxonomic character. The first tarsal segment has a pair of setae usually hyaline and sometimes flattened; just distal to these is a pad-like lobe, the euplantula (sens, Kéler, 1952). Examination of sections and of the whole structure with the light and scanning electron microscopes (Pl. 7, figs. 37–41) suggests that the euplantula, in at least some species, has an outer ventral membrane covering a honey-combed area within which is a framework of vertical strands (Pl. 7, fig. 41) or of vertical and horizontal strands giving a characteristic banded appearance (Pl. 7, fig. 40). The form of these strands may be useful taxonomic characters and appears to be constant

within genera and groups of genera; all the members of the *Colpocephalum*-complex, for instance, have the vertical strands only; other genera not belonging to this complex also with vertical strands only are *Microctenia*, *Hoazineus*, *Bonomiella* and *Trinoton*. However, it is not possible to use this character for basic divisions in the key as there are a number of genera in which no internal striations can be seen and in *Menopon* it has been possible to see the striations in only some of the species. The euplantula of the second tarsal segment may be similar to that of the first (e.g. *Bucerophagus*) or show considerable differences: in some of the species in which euplantula I shows vertical striations only, II may be elongated to more than half the length of the tarsus with vertical striations and deeply serrated margins (e.g. *Turacoeca*). In this position in *Pseudomenopon* there are rows of comb-like processes (Pl. 6, fig. 35); Kéler (1952 : 581) suggested that this structure was homologous with euplantula II. Its presence enables the nymphs of *Pseudomenopon*, in which the characteristic gular plate is not developed, to be recognized generically. Examination of this area with the scanning electron microscope suggests that in some species the form of the processes may prove to be a diagnostic character. The characters of euplantula I, are probably similar on all three legs, but are usually best seen on the first leg as in mounted specimens this is more often lying in the dorsoventral plane. Pad-like structures along the inner side of the claw can be considered as pulvilli; it is not possible to say whether their degree of development is of taxonomic use. Certain other characters of the tarsus are not used owing to the difficulty of seeing them in all species or in all specimens of a species.

Abdomen

The abdomen varies greatly in shape and in those species in which the plates are not heavily sclerotized the proportions can be affected by the treatment of the specimens. The shape of the abdomen (together with the rest of the body) may be an adaptation to some particular factor of the environment, such as the inside of the quill (Clay, 1962 : 192; Tuff, 1967 : 247). A genus based on such characters might have been derived from different stocks (e.g. *Somaphantus*, see below, p. 19) and the species might have lost many of the characters showing their affinities: *Rediella* with a distinctive appearance, resembles *Actornithophilus* from the same host order in the characters of the male genitalia and the spacing of the anterior mesonotal setae.

There are six spiracle-bearing segments (III–VIII) and two (I–II) anterior to these; posteriorly to tergite VIII, there is usually a single sclerite, but some species have two. In *Myrsidea* females the terga may be strongly modified and tergite I not apparent or with II, greatly reduced in size; these modifications, as that of the metanotum, seem to be no more than specific (Clay, 1966 : 331); members of the *Colpocephalum*-complex may also show tergal modifications in the female. Sternite I is usually apparent but is not so in *Aegypiphilus*; sternites II–VI appear as discrete central plates; VII may be fused or partly fused with the following sternites to form a subgenital plate (♀ *Myrsidea*, Clay, 1966, fig. 26; *Chapinia*, both sexes) or VII may be separated from the subgenital plate (♂ *Myrsidea*, Clay, 1966, fig. 27;

Actornithophilus, both sexes); in females of the *Austromenopon* species parasitic on the Procellariformes both conditions of VII are found, so that this is not necessarily a generic character. Rarely the males show modifications of the sternites as in *Cacamenopon* Price (sternites VI–VII) and *Holomenopon goliath* Clay (sternites VIII–IX). Post vulval sclerites may or may not be apparent; their chaetotaxy is sometimes a constant and generic character (*Kurodaia* and *Nosopon*).

The pleurites are usually in the form of discrete plates separated from the sternites by a membraneous area, frequently sculptured, and from the tergites by a narrow suture. In *Piagetiella* there may be some fusion between pleurites and tergites, either sexual or specific; in the female *Myrsidea* with modified abdomens they may be reduced, absent or modified in various ways. In *Comatomenopon elbeli* the female has sucker-like organs on pleurite III. The inner posteroventral angle of some or all of the pleurites may be prolonged as a process (Text-fig. 26); this character appears to be generic in some groups (*Plegadiphilus*), but is present or absent in others (*Menacanthus* from the Galliformes). Patterns of internal thickening of the pleurites and lateral areas of the tergites may be only of specific value (in *Austromenopon* for instance) and are perhaps not useful generic characters.

The female anogenital region shows considerable variation: the typical anal corona may be present or absent in the species of *Austromenopon* parasitic on the Procellariformes (Clay & Moreby, 1967 : 158); some species of the Galliformes-infesting Menoponidae may also lack the typical anal corona and show various other modifications of the venter of the terminal segments; however, these are not always correlated with other characters showing differences and may not be of any phylogenetic significance. The lateral edges of the anus may show various setae-bearing processes which appear to be constant in certain groups and generic in character (*Turacoeca*, *Chapinia*). The male genitalia may be similar throughout a genus or genera, with the occasional species being distinct (e.g. *Menopon*). In dealing with such males and females it does not seem reasonable or useful to erect a new genus because one sex shows some unique character, while the other sex is not separable from the rest of the group. This is illustrated by the genus *Menopon* in which there is much diversity of the female anogenital region and the male genitalia. In *M. gallinae* the terminal segment of the female abdomen is elongated, the anterior (ventral) margin of the anus is widely separated from the posterior (dorsal) margin which is terminal and beset by a row of spine-like setae; in *pallens* and *interpositum* the anal margins are not so widely separated and the anus appears more normal; in *spinulosum* the last segment is not elongated, the setae surrounding the anus form a triangle, the terminal margin of the abdomen does not bear the posterior anal setae, but has a number of long and short setae. The male genitalia also show considerable difference between the typical *gallinae* form and those with the greatly enlarged and asymmetrical parameres of the *spinulosum* group.

Various structures associated with the female genital chamber (Clay, 1961, fig. 7.z; Price, 1966 : 18) and the form of the bursa copulatrix (Clay, 1968 : 207) provide useful specific and sometimes generic characters. Although the presence or absence of spermatophores in the male cannot be used as a key character it is possible that their distribution within the genera of the Menoponidae may be of taxonomic interest. They are probably present in all *Myrsidea* (Clay, 1968 : 207) and have also been seen in species belonging to other genera (e.g. *Austromenopon, Ciconiphilus, Dicteisia*).

The spiracles usually open on the tergites, but in some species of *Myrsidea* they open on the pleurites or the membraneous area between tergite and pleurite; in *Colpocephalum heterosoma* the spiracles open on the pleurites in the female and on the tergites in the male (Price, 1965 : 128). Although the presence of crop teeth has been used as a generic character they seem to be present in all the Menoponidae: further dissections of suitable material are necessary to see whether they will show any taxonomic characters.

The Chaetotaxy of the Abdomen. All species examined have a small anterolateral seta each side of tergite I and II. At each end of the posterior row of seta, or somewhat submarginal to it, on tergites II–VIII is the post-spiracular seta with the two small associated setae (Clay, 1954 : 716); on tergite I the seta in this position is usually long and is included under the post-spiracular setae. A generally constant character is the presence or absence of a small seta laterad to each of the long outer setae on tergite I or to the post-spiracular setae on one or more tergites. Setae may be present or absent on sternite I in different species belonging to the same genus (e.g. *Myrsidea*). The presence of ctenidia on one or more sternites is usually associated with similar ones on the venter of the third femur (*Colpocephalum*-complex); in a few genera (e.g. *Piagetiella, Eomenopon*) there may be abdominal ctenidia but none on the femur. The position and the number and size of the setae in the sternal brushes may be a useful generic character.

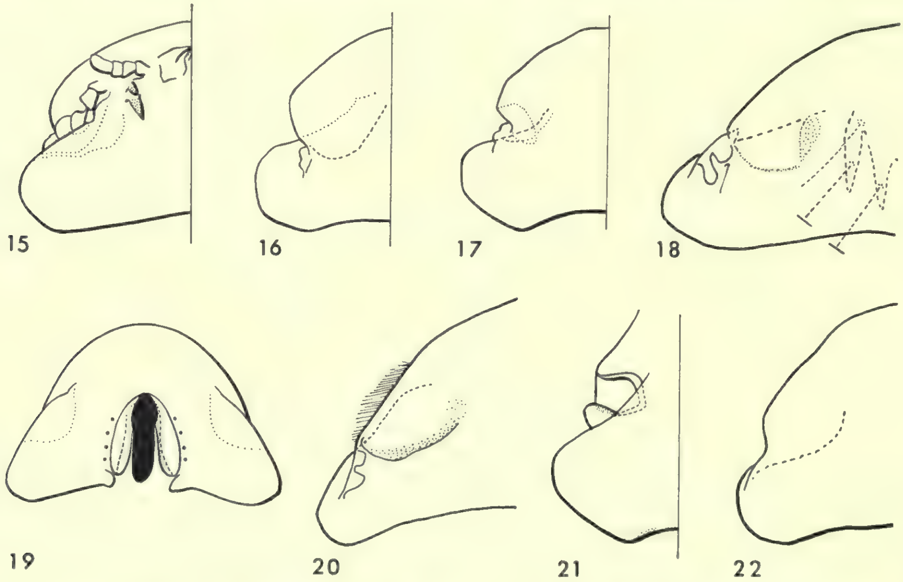
Part II

KEY

INTRODUCTION

The key includes all the generally recognized genera and subgenera (with the exception of those belonging to the *Colpocephalum*-complex and the *Menacanthus*-complex) even where it is considered that there is no advantage in the recognition of some of these taxa. The *Colpocephalum*-complex, as interpreted here, comprises all those genera with ctenidia on the venter of the 3rd femur with the exception of *Cuculiphilus* sens. lat., *Bucerocolpocephalum, Piagetiella, Turacoeca* and *Odoriphila*; it is possible that the last genus should be included. *Dicteisia* may belong to the complex but is separated in the key. Other characters common to the complex are the contiguous alveoli of head setae 26 and 27; setae 24 and 25 are usually minute to short, in a few species they are longer, but do not reach to the end of the pronotum; the presence of a vertical patch of submarginal setae on the temples; head sensilla *c.* usually present; four anterior mesonotal setae; usually more than two central mesosternal setae; mesosternum normal; tibiae II–III usually with submarginal patch or row of outer distal dorsal setae, euplantula with vertical striations only; ctenidia on one or more sternites. Balter (personal communication and see Balter, 1968) has found that the operculum of the egg opens diagonally in species of the complex from the Galliformes, Falconiformes, Ciconiiformes, Pelecaniformes, Psittaciformes and Passeriformes; in addition this character is found in the eggs of *Nosopon*, but not of *Osborniella* or any of the species of *Ciconiphilus* examined.

The *Menacanthus*-complex comprises *Menacanthus*, *Amyrsidea*, *Argimenopon* Eichler, *Cracimenopon* Carriker and *Desumenopon* Carriker, its species being parasitic mainly on the Galliformes and Passeriformes. Divisions within this complex are dependent on which characters are used, these include: width of head and form of its dorsolateral margin; form of gular and prosternal plates; development of the hypopharynx; presence of postpalpal processes; shape of the antennal segments; number of setae on coxa I; number and position of the sternal brushes of setae; presence of sternal spiniform setae; position of the post-spiracular setae on tergites I–II; degree of development of the internal tergal and pleural thickening; presence of a prolongation of the posteroventral corner of the pleurites; terminal segments of the female abdomen and the male genitalia. A distinctive species group (including the type species of *Menacanthus*) parasitic on the Passeriformes has long postpalpal processes; an approximately rectangular, strongly pigmented gular plate with or without a central thinner area; two to four setae anterior to the subocular comb row; three ventral sensilla on the trochanter; and spiniform setae laterally on the posterior margin of the sternites. Another group (e.g. *M. alaudae*), also parasitic on the Passeriformes, has short postpalpal processes; gular plate various; four to five setae anterior to the comb row, two of which are long; four ventral sensilla on the trochanter; and no spiniform setae on the sternites. This group, in addition to being found on the Passeriformes, is found on the Picidae (the species may have



FIGS. 15–22. Heads of Menoponidae genera. 15, *Odoriphilia*. 16, *Neomenopon*. 17, *Meromenopon*. 18, *Colimenopon*. 19, *Pseudomenopon*. 20, *Ancistrona*. 21, *Dennyus*. 22, *Gruimenopon*.

fewer setae anterior to the comb row and rather longer head processes) and on the Galliformes (length of processes varies). Amongst other species parasitic on the Passeriformes are those showing characters intermediate between the two groups: a species from one of the Parulidae has the characters of the first group but the postpalpal processes are small; *Menacanthus crateropus* has shorter processes than in the first group, no sternal spiniform setae, three setae anterior to the comb row and three sensilla on the trochanter; the species on *Salpinctes* (Troglodytidae) has small processes, four to five setae anterior to the comb row; no sternal spiniform setae and three sensilla on the trochanter. Elsewhere (Hopkins & Clay, 1955 : 180) the possibility has been discussed that some of the species of *Menacanthus* from the Galliformes are nearer to species of *Amyrsidea* than to other species included in *Menacanthus*, being separable only by the presence of the postpalpal process.

It is possible that *Menopon*, *Clayia* and *Somaphantus* also belong to the *Menacanthus*-complex. It has already been suggested that the species of *Somaphantus* might be derived from more than one Galliformes-infesting stock, the similarity being due to the environment of the quill inside which they live. This would explain some of the differences between the species such as the position of the post-spiracular setae and chaetotaxy of the head; *spencei* Emerson is the only species with a circular structure within the genital chamber. *S. kingi* Emerson and Price (no specimens seen) resembles other species of *Somaphantus* in the tubular abdomen, but differs in the number of the sternal brushes and does not have the typical *Somaphantus* head; its affinities lie perhaps with such species as *Amyrsidea elbeli* Emerson and Stojanovich; the female of this latter species resembles *Menopon gallinae* in the prolongation of the last segment and the form of the anus. *S. kingi* is not included in *Somaphantus* in the key.

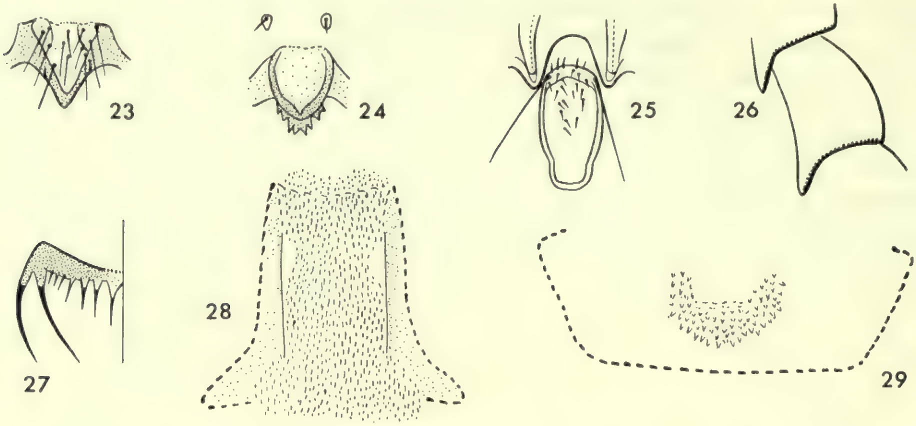
These genera of Menoponidae found on the Galliformes are possibly derivatives from a single ancestral stock perhaps parasitic on an early Galliformes stock; the evolution of the parasites may have included not only divergence with the divergence of their hosts but also perhaps secondary infestations from host to host at the specific and supra-specific level.

Notes

Illustrations. In preparation of this paper use has been made of the Stereoscan scanning electron microscope (S.E.M.) and this has made possible the elucidation of certain structures. Although most of these can be seen with the light microscope, especially when once identified and elucidated with the scanning electron microscope, photographs taken with this latter instrument are the most accurate method of representing small structures.

Authors and Bibliographical References. In order to save space authors of genera and species appearing in Hopkins & Clay, 1952, 1953, 1955 are not cited and only those references which do not appear in Kéler, 1960 are listed. Published works consulted but not always acknowledged in detail are the excellent series of papers on the genera of the *Colpocephalum*-complex by Price *et alia*.

Supplementary Characters. These are separately paragraphed in the key; they are further attributes characteristic of the genus or group of genera and may help to confirm the correct placing of the specimen being identified. New species anomalous in respect of the key characters may still be placed in the correct genus; the key is an artificial arrangement and should be made to fit the genus not the genus to fit the key.



FIGS. 23–29. 23–24, Prosternal plates. 23, *Machaerilaemus*. 24, *Holomenopon*. 25, *Eureum*, prosternal and part of gular plate. 26, *Plegadiphilus*, abdominal pleurites III-IV. 27, *Turacoeca*, ventral margin of ♀ anus. 28–29, Microtrichial patch in ♀ genital chamber. 28, *Cuculiphilus* (*Falcophilus*). 29, *Cuculiphilus* (*Cuculiphilus*).

Actornithophilus and Longimenopon. These are placed together in the key, couplet 49, as it seems probable that the species of *Longimenopon* will prove to be generically inseparable from those included in *Actornithophilus* (see Timmermann, 1965 : 179).

KEY TO GENERA OF THE MENOPONIDAE

1 Alveoli of marginal temporal setae 26 and 27 closely associated (Text-figs. 2–3) 2
– Alveoli of marginal temporal setae 26 and 27 not closely associated (Text-fig. 1) 30
2 (1) Head seta 26 similar to 27, long and proximally stout.
Mandibles each with 3–4 teeth, some posteriorly tuberculate; deep narrow preocular slit; prosternum with > 2 central setae; ♂ with tibial spur; 3rd femur with or without ctenidia; one or more sternites with ctenidia; large species, length > 3·8 mm . . . . ***PIAGETIELLA***
– Head seta 26 significantly shorter and finer than 27 (Text-fig. 2) 3
3 (2) Venter of 3rd femur with ctenidia (Text-fig. 14)
Setae 24–25 short to medium 4
– Venter of 3rd femur without ctenidia 8
4 (3) Sternites without ctenidia; no preocular notch or slit.
Each side of ♀ tergite VI comb of elongate setae with clubbed ends held in pocket in tergite VIII . . . . NEW GENUS (in press)
– One or more sternites with ctenidia; preocular notch or slit 5
5 (4) 2 postpalpal processes each side (Text-fig. 15)
Narrow preocular slit; prosternum with > 2 central setae; 4 anterior mesonotal setae; sternites III-IV with single full ctenidium each side
ODORIPHILA

– Without 2 postpalpal processes each side 6

6 (5) 2 anterior mesonotal setae; ventral margin of ♀ anus with 2 processes each end, each bearing long spine-like setae (Text-fig. 27).
Occipital setae (21–22) minute, seta 23 long and lateral to 22; broad shallow preocular notch; single ctenidium each side of sternites III–IV or III–V ***TURACOECA***

– 4 anterior mesonotal setae; ♀ anus without ventrolateral processes.
Euplantula with vertical striations only 7

7 (6) Typical oblong strongly pigmented postnotum absent.
Seta 20 medium length, longer than 19; > 2 prosternal setae; pronotum with scattered minute setae; sternite III-IV with single full ctenidium each side ***DICTEISIA***

– Typical oblong strongly pigmented postnotum present ***COLPOCEPHALUM*-complex** p. 17

8 (3) 2 anterior mesonotal setae 9

– 4 anterior mesonotal setae 11

9 (8) Prosternal plate well-developed, pointed posteriorly (Text-fig. 23) prosternum with > 2 central setae.
Antennal fossa deep, head broad at temples and preocular expansions; 3rd femur without brush; trochanter with not more than 3 ventral sensilla ***MACHAERILAEMUS***

– Prosternal plate not well developed and not pointed posteriorly; prosternum with 2 central setae
Seta 23 missing or anterior to 22 10

10 (9) Proximal antennal sensillum large, in pit and widely separated from distal (Pl. 2, figs. 10–11); claw without large basal process; bilobed process each end of ♀ ventral anal margin with long setae, some of which may be stout and spiniform; temples expanded; euplantula banded; trochanter with more than 3 ventral sensilla.
Seta 23 missing or minute; 3rd femur with or without brushes ***BUCEROPHAGUS***

– Antennal sensilla small, adjacent and terminal; claw with large basal process (Text-fig. 12); ♀ anus without ventral processes; temples scarcely expanded; euplantula not banded; trochanter with 3 ventral sensilla.
3rd femur without brushes; seta 24–25 short. . . . ***BONOMIELLA***

11 (8) Tibiae I-III with outer submarginal comb of short setae (as in Pl. 6, fig. 34); brushes on sternite IV-V towards centre of segments.
Preocular slit; terminal antennal segment elongate, cylindrical; 3rd femur with thick brushes; euplantula with vertical striations only; setae 24–25 short . . . . ***HOAZINEUS***

– Tibiae I-III without such comb of setae; brushes or ctenidia on sternites IV-V absent or lateral on segments 12

12 (11) Gular plate large and tripartite (Text-fig. 19); 2nd tarsal segment of 2nd and 3rd legs with combs of processes (euplantula II, Pl. 6, fig. 35).
Seta 24 or 25 long; preocular slit; postpalpal processes present or absent; some abdominal pleurites with posteroventral corners prolonged ***PSEUDOMENOPON***

– Gular plate and tarsi not as above 13

13 (12) Gular plate with 4 seta-bearing processes (Text-fig. 18).
Seta 24 or 25 long; head considerably broader than long; antennal fossa deep and pouch-like; prosternal plate with posterior process and > 2 setae; tergites I & II with short seta laterad to post-spiracular seta ***COLIMENOPON***

– Gular plate without 4 seta-bearing processes 14

14 (13) One spinous process near base of antenna and one near base of maxillary palp; thickening running inwards from anterior end of subocular comb row bearing at least one seta.

Close set row of subocular setae; head sensilla ***c.*** not apparent; tergite I with short seta laterad to post-spiracular seta; euplantula banded; seta 24–25 short . . . . (***KELERIMENOPON***) 15

– Head without such spinous processes and without setae-bearing thickening running inwards from comb row 16

15 (14) Abdominal pleurites without prolongation of ventro-posterior corner; broad deep preocular notch . . . . . sg. ***LORIMENOPON*** Price & Emerson

– Some abdominal pleurites with prolongation of ventro-posterior corner; narrow preocular slit . . . . sg. ***KELERIMENOPON***

16 (14) Labrum with striated lobe (Pl. 4 fig. 23); hypopharynx characteristic (Pl. 4, fig. 22).

Head broad, dorsal preocular margin overlapping ocular margin (Text-fig. 16); sensilla *c.* not apparent; setae 24–25 short . . ***NEOMENOPON***

– Labrum without striated lobe; hypopharynx not as in Pl. 4, fig. 22 . . . 17

17 (16) Dorsum of head with scattered minute alveoli

♀ with 1–2 circular or oval structures associated with genital chamber; setae 24–25 short 18

– Dorsum of head without scattered minute alveoli 20

18 (17) Distal anterior angle of pedicel not markedly prolonged; posterior part of coxa I with > 6 setae; single structure in ♀ genital chamber; ♂ genitalia asymmetrical.

Head semilunar 19

– Distal anterior angle of pedicel markedly prolonged; posterior part of coxa I with < 6 setae; 2 oval structures in ♀ genital chamber; ♂ genitalia symmetrical . . . . ***MIMEMAMENOPON***

19 (18) Sternite I divided vertically, partially or entirely; gular plate sculptured; prosternum with only 2 central setae . . . . . ***EOMENOPON***

Sternite I not divided; gular plate not sculptured; prosternum with > 2 central setae . . . . ***PACIFIMENOPON***

20 (17) Venter of 3rd femur without brushes; temples with ventral submarginal patch or row of setae; setae 24–25 short; postvulval sclerite with setae; head broad at temples, semilunar . . . . ***NOSOPON***

– Without above combination of characters 21

21 (20) One postpalpal process each side; seta 24–25 short

Sensilla *c.* not apparent; prosternal plate with well-developed posterior process or with 3 irregular small processes 22

– Either without postpalpal processes or if present then seta 24 or 25 long . . 23

22 (21) Head without preocular slit or notch; pleurites without prolongation of postero-ventral corners; tergite I without short seta laterad to post-spiracular seta; well-developed circular structure of cellular appearance associated with ♀ genital chamber . . . . ***APTERYGON***

– Head with preocular slit; some pleurites with posteroventral prolongations; tergite I with short seta laterad to post-spiracular seta; either no or different type of structure associated with ♀ genital chamber . . ***HOHORSTIELLA***

23 (21) 3 or more preocular setae (10–11) on at least one side; tibiae II-III with patch or row of outer dorsal submarginal setae; dorsal preocular margin overlaps ocular margin (Text-fig. 17).

Head sensilla *c.* not apparent; euplantula banded; seta 24–25 short ***MEROMENOPON***

– Without above combination of characters 24

24 (23) Postnotum not apparent; head seta 16–19 all long and stout, reaching at least to the transverse pronotal carina.
Seta 24 long and stout; no preocular notch or slit . . ***NUMIDICOLA***

– Postnotum present; head seta 16–19 not as above. 25

25 (24) Brushes on sternite IV only.
No setae between 23 and 27 reaching beyond transverse pronotal carina . 26

– Brushes absent or not on sternite IV only 27

26 (25) The 2 subterminal setae of maxillary palp with definite gap between their alveoli; shape of head characteristic (Pl. 7, fig. 44); abdomen narrow and tubular . . . . ***SOMAPHANTUS***

– The 2 subterminal setae of maxillary palp with their alveoli contiguous; shape and head of abdomen otherwise . . . . ***MENOPON***

27 (25) Inner central pronotal setae absent or on posterior part of pronotum; no seta between 23 or 27 reaching beyond transverse pronotal carina.
Broad or shallow preocular notch . . . . ***CLAYIA***

– Inner central pronotal setae on or near transverse carina; one seta between 23 and 27 reaching below transverse pronotal carina 28

28 (27) Terminal antennal segment without signs of division; ridges numerous and close together (Pl. 3, fig. 13) . . . ***MENACANTHUS*-complex,** p. 18

– Terminal antennal segment with form of ridges and pigmentation suggesting one or more divisions, or if no signs of division, ridges are few and widely separate (Pl. 3, fig. 14) 29

29 (28) More than 2 central prosternal setae; pleurites without posterior processes; tergites with transverse bar . . . . . . ***EUCOLPOCEPHALUM***

– Only 2 central prosternal setae; some abdominal pleurites with posterior processes; no transverse tergal bars . . . . . . ***PLEGADIPHILUS***

30 (1) Thorax with 2 large sternal plates bearing many setae (Pl. 5, fig. 25); scape (and pedicel) with distal anterior prolongations (Text-fig. 6).
Seta 11 on protuberance; large species, length $> 4{\cdot}00$ mm . ***TRINOTON***

– Thorax without such sternal plates; scape without distal anterior prolongation 31

31 (30) 2 anterior mesonotal setae.
Seta 23 absent or anterior to 22; at least one of the setae 24, 25 or 26 long; sensilla *c.* not apparent; euplantula banded 32

– 4 anterior mesonotal setae (sometimes widely spaced) 36

32 (31) One pair of mid-dorsal head setae; not more than one pair of central pronotal setae; no preocular slit or notch; ♀ ventral anal margin without lateral setae-bearing processes 33

– Two pairs of mid-dorsal head setae; 2 pairs of central pronotal setae; preocular slit or notch; ♀ ventral anal margin with lateral setae-bearing processes . 35

33 (32) Prosternum with 2 central setae; dorsal margin of head without ventral truncated ovoid excavation; seta 23 absent; no central pronotal setae.
Mesothorax with sternum, pleura and tergum fused to form strongly pigmented ring . . . . ***MYRSIDEA***

– Prosternum with > 2 central setae; ventral truncated-ovoid excavation in dorsal margin of head with thickened anterior rim; seta 23 present; one pair of central pronotal setae 34

34 (33) Gular plate horseshoe-shaped (Text-fig. 25); temporal carina not developed ***EUREUM***

– Gular plate not horseshoe-shaped; temporal carina well developed ***DENNYUS***

35 (32) Venter of 3rd femur and sternite IV with ctenidia; terminal antennal segment with signs of division; ♀ anal processes with stout spiniform setae ***BUCEROCOLPOCEPHALUM***

– Venter of 3rd femur and sternite IV without ctenidia; terminal antennal segment without signs of division; ♀ anal processes with long setae . ***CHAPINIA***

36 (31) Venter of 3rd femur and lateral areas of some sternites with comb-like outgrowths (Pl. 6, fig. 32); distal tarsus swollen; claws delicate with narrow elongate points (Pl. 6, fig. 36).

Euplantula with vertical striation only; postnotum not vertically oblong; preocular notch . . . . ***MICROCTENIA***

– Venter of 3rd femur and lateral areas of sternites without comb-like out growths; tarsi and claws not as above 37

37 (36) Centre of mesosternum with 2 setae.

– Tergite I with short seta laterad to post-spiracular setae, may be lacking in *Austromenopon becki* 38

– Centre of mesosternum with $>$ 2 setae.

Seta 23 missing or anterior to 22; sternal brushes absent or only on, or thickest on IV 47

38 (37) Mesothorax as a sclerotized ring formed by fused sternum, pleura and tergum; temples with ventral submarginal patch or rows of setae.

Seta 18 widely posterolateral to 17; group of 3 subterminal setae on maxillary palp (Pl. 7, fig. 45); terminal segment of antenna subdivided (Pl. 1, fig. 3); head broad with narrow preocular slit 39

– Mesothorax not fused as above; temples without ventral submarginal patch or rows of setae 43

39 (38) Venter of 3rd femur without ctenidia; tergites I-VII with short seta laterad to post-spiracular seta . . . . NEW GENUS (in press)

– Venter of 3rd femur with ctenidia; tergites III-VII without short seta laterad to post-spiracular seta.

Euplantula with vertical striations only . . . (***CUCULIPHILUS***) 40

40 (39) Postpalpal processes present . . . . sg. ***CARRIKERIA***

– Postpalpal processes absent 41

41 (40) Abdominal sternite I not apparent . . . . . . sg. ***AEGYPIPHILUS***

– Abdominal sternite I apparent 42

42 (41) ♀ genital chamber with vertically elongate patch of microtrichia and with sclerite each side with thickened inner margin (Text-fig. 28); ♂ with stout spiniform setae on tergite VII . . . . sg. ***FALCOPHILUS***

– ♀ genital chamber with patch of microtrichia not vertically elongate and without such sclerite each side (Text-fig. 29); ♂ without spiniform setae on tergite VII . . . . sg. ***CUCULIPHILUS***

43 (38) Narrow preocular slit.

Euplantula banded 44

– Without preocular slit.

Seta 23 anterior to 22 45

44 (43) Eyes in normal position on dorsolateral margin; dorsolateral and ventrolateral margins normal (Pl. 4, fig. 19); seta 23 in line with 22 and 21; tibiae II and III with 1–2 irregular submarginal rows of dorsal setae; tergite II without short seta laterad to post-spiracular seta. . . . NEW GENUS Ryan & Price in press

– Eyes not marginal (Pl. 1, fig. 5); cavity between dorsolateral and ventrolateral margins roofed over distally (Pl. 4, fig. 20); seta 23 anterior to 22; tibiae II and III without extra rows of dorsal setae; tergite II with short seta laterad to post-spiracular seta . . . . ***EIDMANNIELLA***

45 (43) Large triangular or rectangular postnotum; dorsolateral margin of head with row of short setae.

No typical subocular comb row; only one of labral setae long each side; 2 short and 3 long setae between setae 28 and 23; venter of 3rd femur without brushes . . . . ***ANCISTRONA***

– Normal vertically oblong postnotum; dorsolateral margin of head without row of short setae 46

46 (45) Prosternal plate with deeply serrated margin (Text-fig. 24); tergite II with short seta laterad to post-spiracular seta . . . . . . **HOLOMENOPON**

– Prosternal plate without deeply serrated margin; tergite II without short seta laterad to post-spiracular seta . . . . . **AUSTROMENOPON**

47 (37) Tibiae I-III with dorsal row or rows of short stout submarginal setae, significantly shorter than outer ventral setae.
At least one long stout seta between 27 and 23 48

– Tibiae I-III without such setae.
Anterior mesonotal setae separated 49

48 (47) Outer dorsal tibial setae in comb-like row (Pl. 6, fig. 34); head narrowed anteriorly; preocular notch backed by heavily pigmented nodus (Pl. 4, fig. 24) **HELEONOMUS**

– Outer dorsal tibial setae in irregular row or rows; head broadly rounded anteriorly; preocular concavity without heavily pigmented nodus (Text-fig. 22) **GRUIMENOPON**

49 (47) Without typical pronotal transverse carina or typical oblong postnotum.
Head narrow, elongate, sides approximately parallel without notch or slit (Pl. 7 fig. 43); terminal antennal segment with signs of division; vertical carina of pronotum well-developed; 3rd femur without brushes . **REDIELLA**

– Transverse pronotal carina and postnotum typical.
Euplantula banded . ***ACTORNITHOPHILUS & LONGIMENOPON***

ACKNOWLEDGEMENTS

I am greatly indebted to J. H. Calaby, R. E. Elbel, K. C. Emerson, J. A. Ledger, G. A. Lincoln, R. L. C. Pilgrim and R. D. Price for supplying material; to Professor R. D. Price for reading the manuscript and making many helpful comments; and to the staff of the British Museum (N.H.) Electron Microscope Unit.

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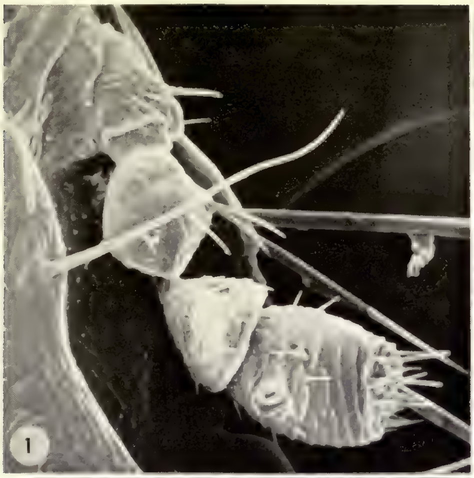
PLATE 1

FIG. 1. *Bucerophagus productus*. Antenna.
FIG. 2. *Bucerophagus productus*. Base of 3rd antennal segment.
FIG. 3. *Cuculiphilus snodgrassi*. 4th and 5th antennal segments.
FIG. 4. *Eidmanniella* sp. n. (in press). 3rd and 4th antennal segments.
FIG. 5. *Eidmanniella* sp. n. (in press). Dorsum of head.
FIG. 6. *Plegadiphilus* sp. Dorsum of head. *o*. ommatidia; *d*. dorsolateral margin of head.
(S.E.M.)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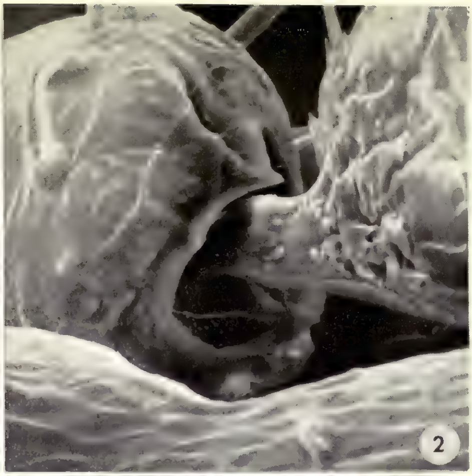
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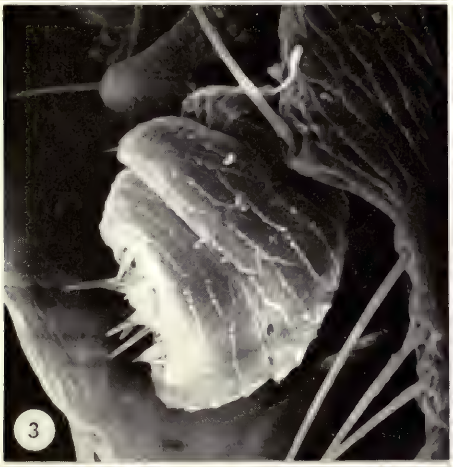
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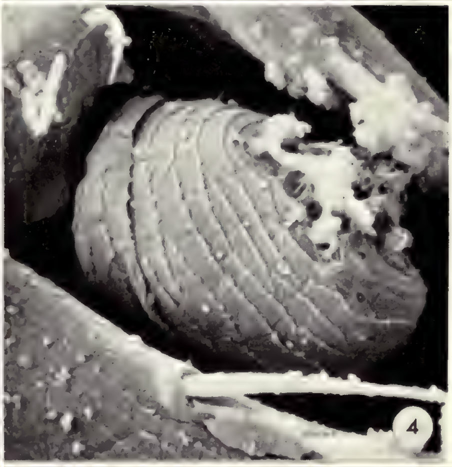
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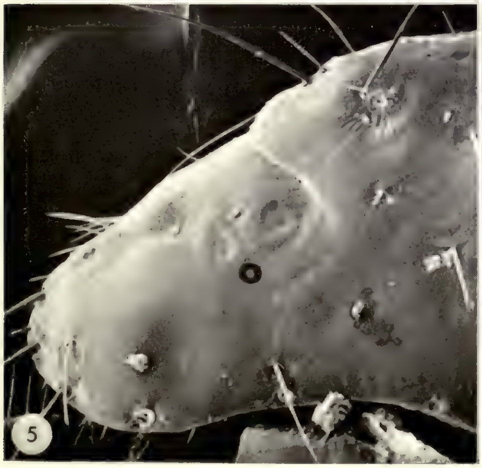
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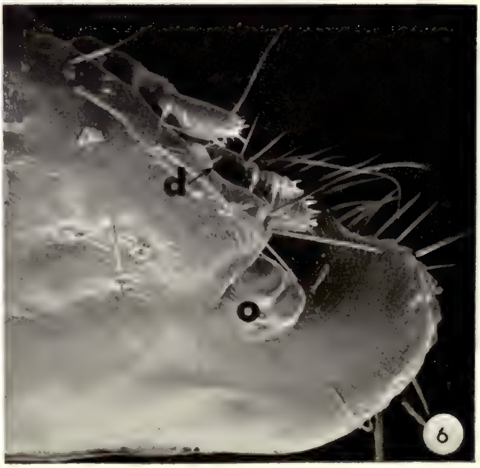
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PLATE 2

FIGS. 7–12. *Bucerophagus antenna* (S.E.M.). *x*. marks the same seta in figs. 7–9; *y*. the same seta in figs. 10–12.

FIG. 7. *B. productus.* Terminal antennal segment.

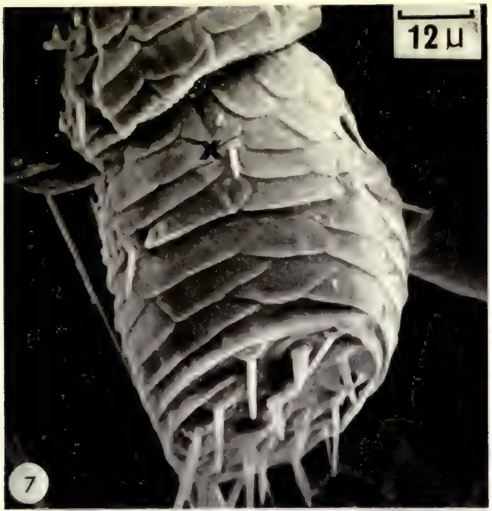
FIG. 8. *B. productus.* End-on view of terminal antennal segment.

FIG. 9. *B. productus.* As fig. 2, enlarged.

FIG. 10. *B. africanus.* Antenna.

FIG. 11. *B. africanus.* Part of terminal segment showing proximal sensillum.

FIG. 12. *B. africanus.* Part of terminal antennal segment. (S.E.M.)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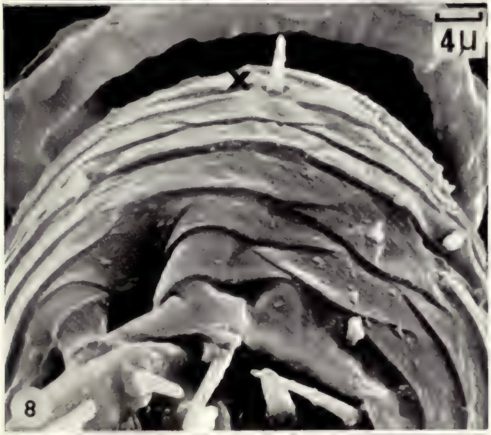
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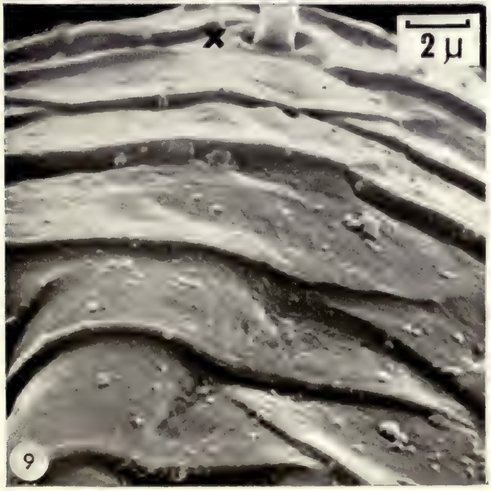
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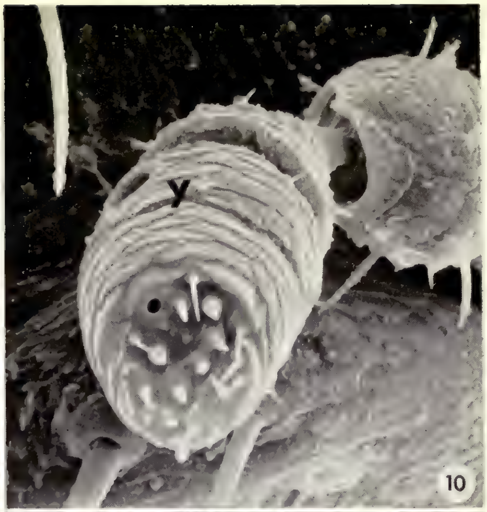
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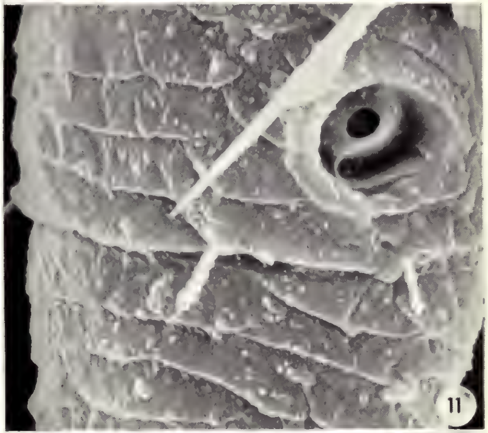
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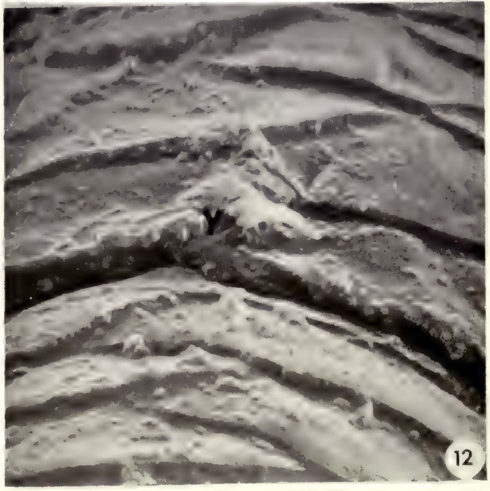
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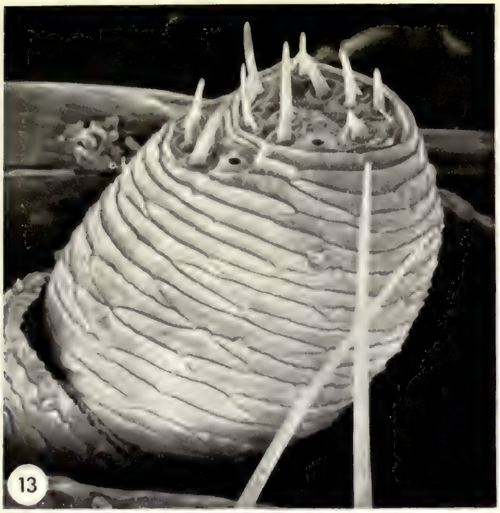
PLATE 3

FIG. 13. *Menacanthus stramineus.* Terminal antennal segment.
FIG. 14. *Plegadiphilus* sp. from *Geronticus eremita.* Terminal antennal segment.
FIGS. 15–16. *Meromenopon* sp. To show variation (not specific) in subocular seta (*s*).
FIG. 17. *Dennyus* sp. Details of metasternal flap.
FIG. 18. *Trinoton emersoni* Clay. Part of white gular area with 2 gular setae. (S.E.M.)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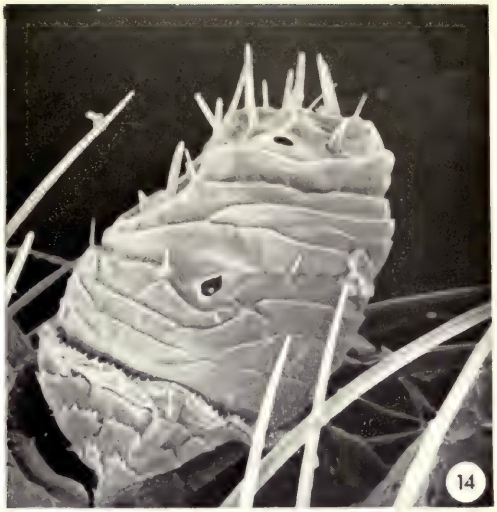
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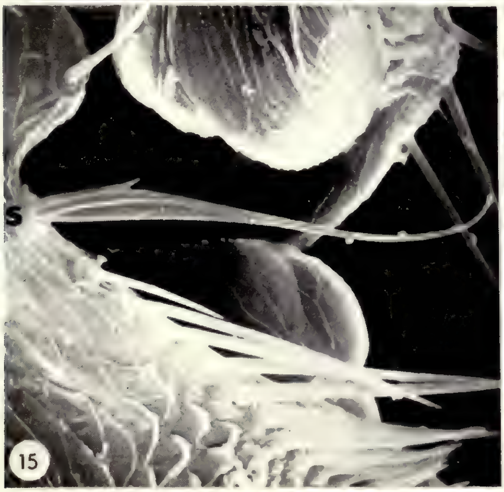
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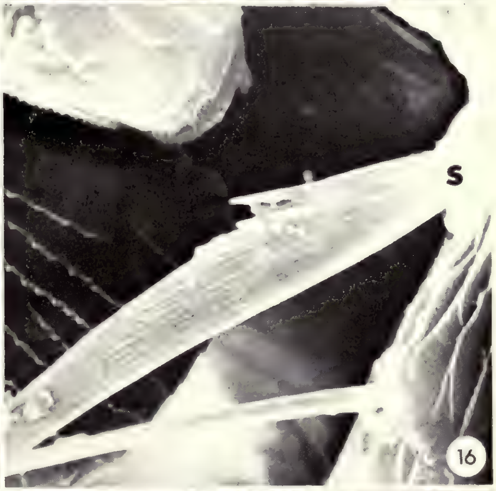
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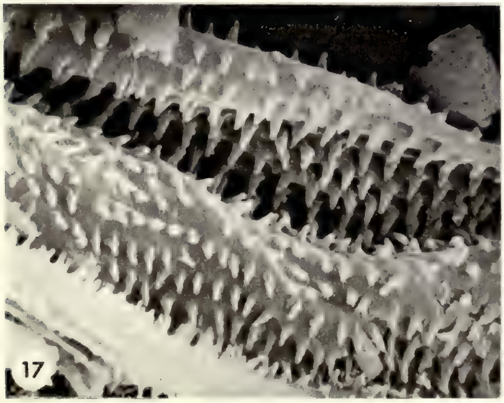
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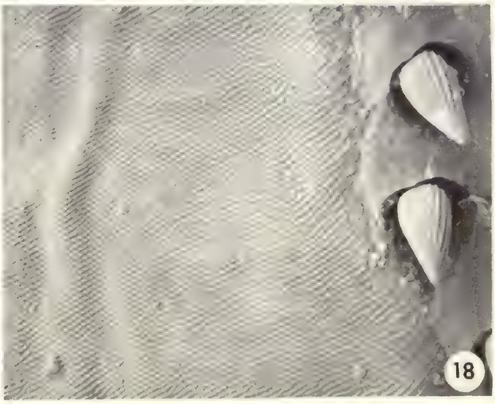
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PLATE 4

FIG. 19. *'Eidmanniella' aurifasciata.* Antennal fossa. *s.* subocular seta; *c.* subocular comb row. (S.E.M.)

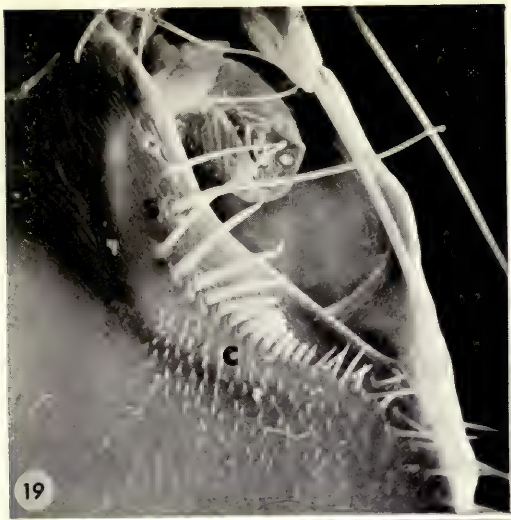
FIG. 20. *Eidmanniella* sp. Antennal fossa. (S.E.M.)

FIG. 21. *Colpocephlaum* sp. *c.* subocular comb row; *t.* submarginal temporal setae. (S.E.M.)

FIG. 22. *Neomenopon* sp. Hypopharynx. (Light microscope. T.C.)

FIG. 23. *Neomenopon* sp. Labrum. (Light microscope. T.C.)

FIG. 24. *Heleonomus* sp. Head. (Light microscope. T.C.)



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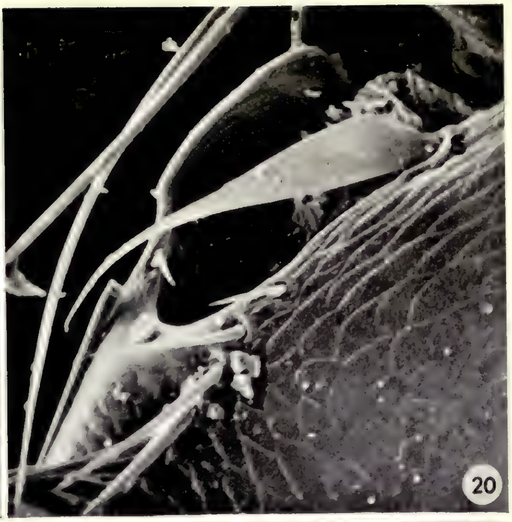

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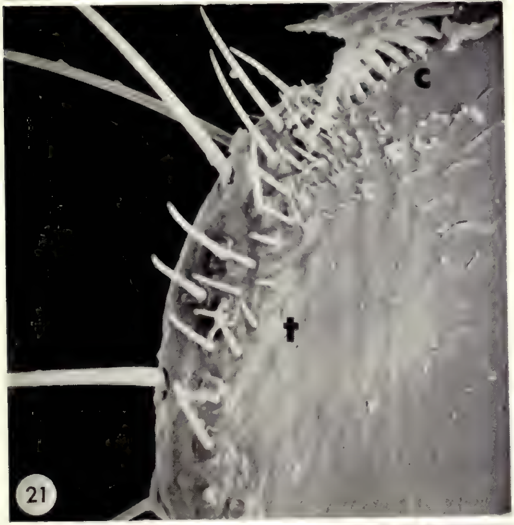

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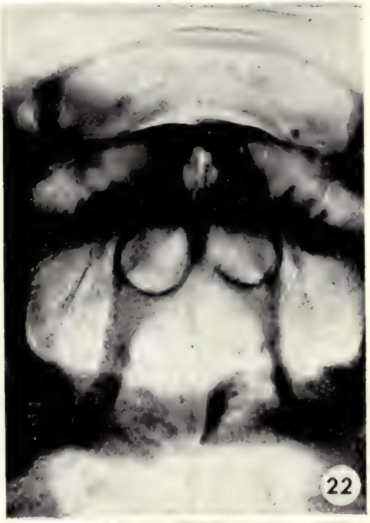

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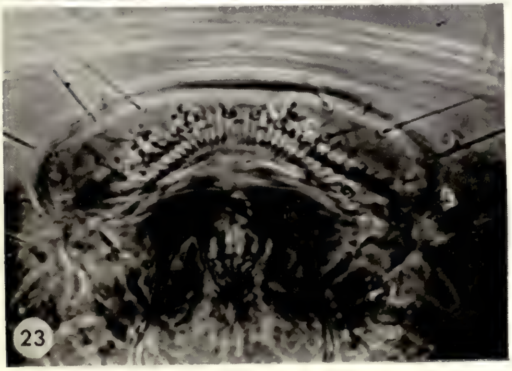

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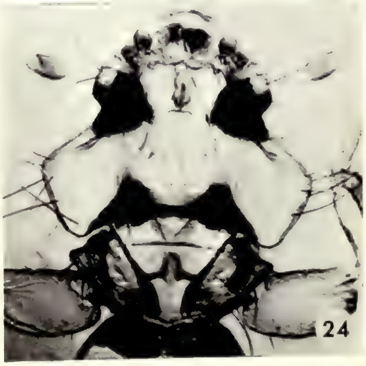

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PLATE 5

FIG. 25. *Trinoton querquedulae*. *g*. white gular area; *m*. metasternal flap. (Direct illumination. T.C.).

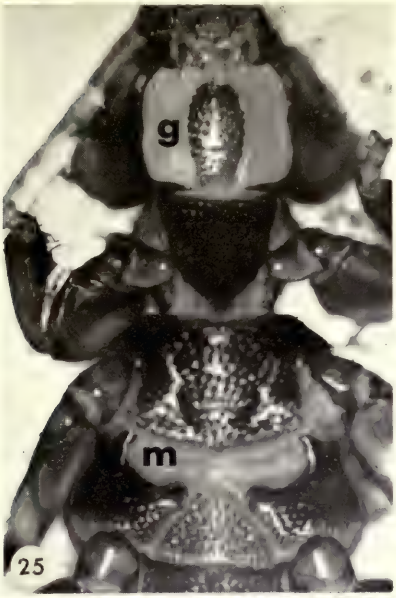
FIG. 26. *Eureum cimicoides*. Venter of thorax and part of abdomen. *m*. metasternal flap (S.E.M.)

FIG. 27. *Eureum cimicoides*. Metasternal flap. (S.E.M.)

FIG. 28. *Trinoton* sp. Part of metasternal flap. (S.E.M.)

FIG. 29. *Eureum cimicoides*. Details of metasternal flap (S.E.M.)

FIG. 30. *Trinoton* sp. Details of metasternal flap (S.E.M.)



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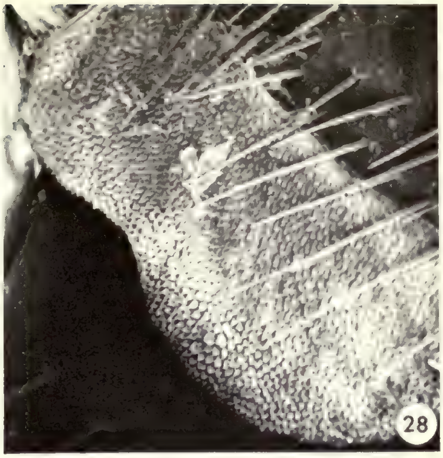

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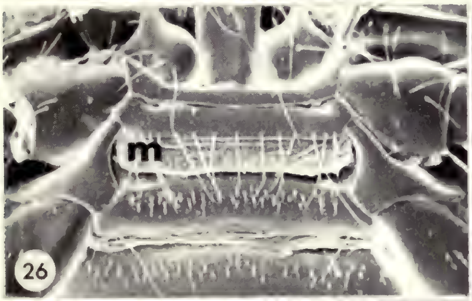

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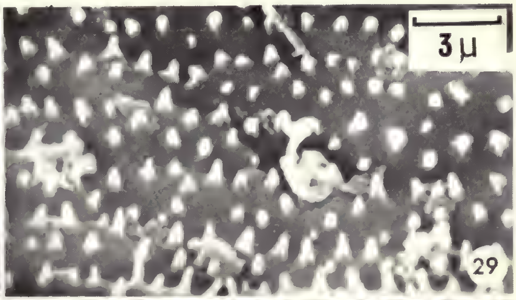

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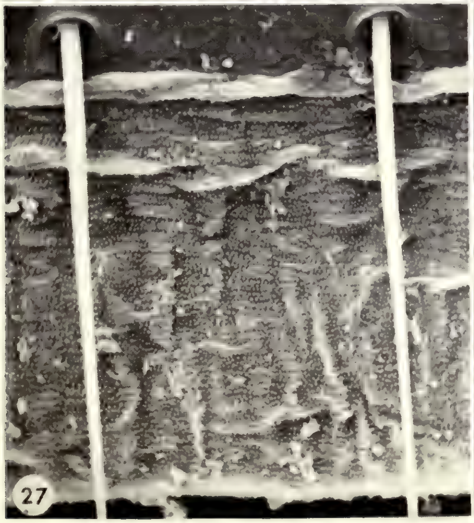

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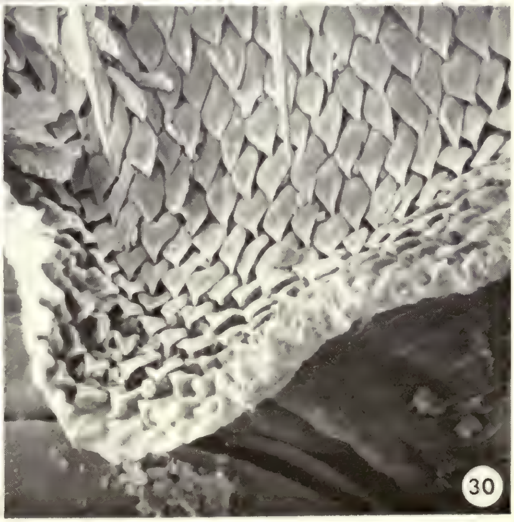

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PLATE 6

Fig. 31. *Colpocephalum* sp. Femoral ctenidia. (S.E.M.)

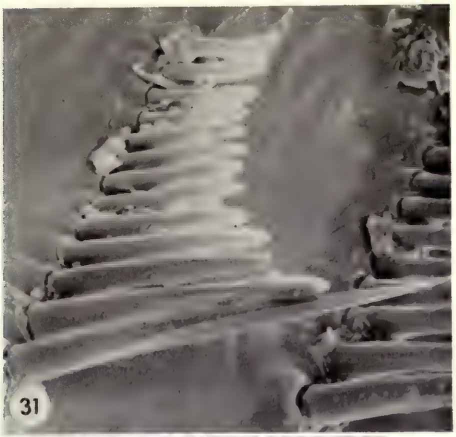
Fig. 32. *Microctenia* sp. Femoral comb-like processes. (S.E.M.)

Fig. 33. *Franciscoloa roseicapillae* Price & Beer. 3rd tibia (Phase contrast T.C.)

Fig. 34. *Heleonomus* sp. Row of setae on outer tibial margin. (S.E.M.)

Fig. 35. *Pseudomenopon pilosum*. Euplantula II. *e*. base of eupodium; *d*. piece of dirt. (S.E.M.)

Fig. 36. *Microctenia* sp. Tarsus. (Phase contrast. T.C.)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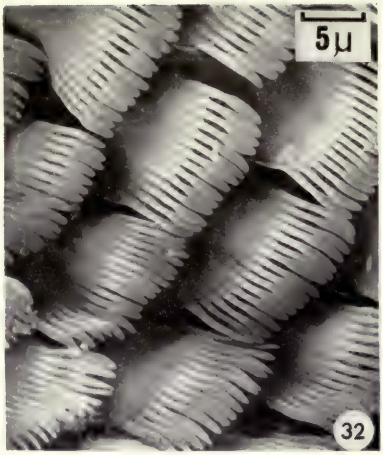
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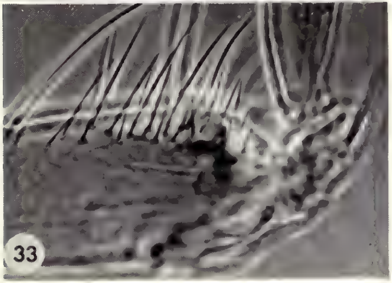
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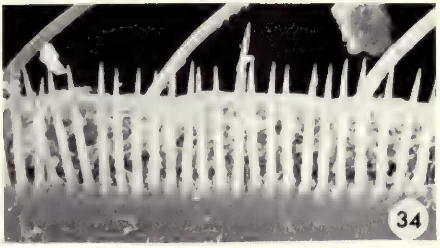
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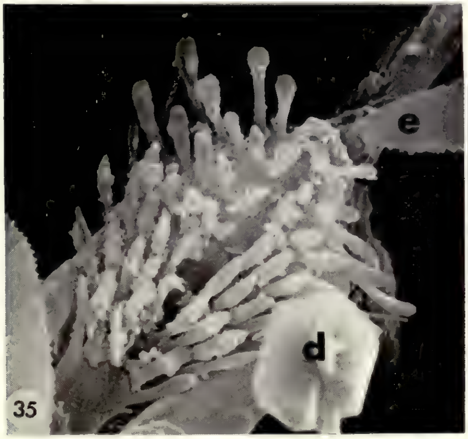
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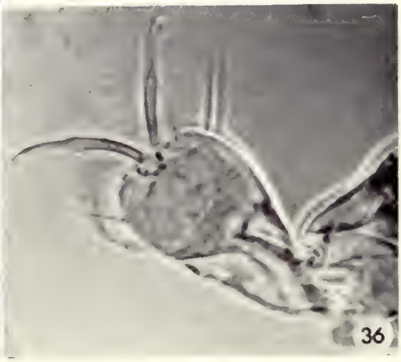
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PLATE 7

FIG. 37. *Amyrsidea* sp. Euplantula I. (S.E.M.)

FIG. 38. *Actornithophilus* sp. Euplantula I. ? without surface membrane. (S.E.M.)

FIG. 39. Part of fig. 2, enlarged (S.E.M.).

FIG. 40. "*Eidmanniella*" *aurifasciata*. Euplantula I, to show horizontal banding. (Phase contrast. T.C.)

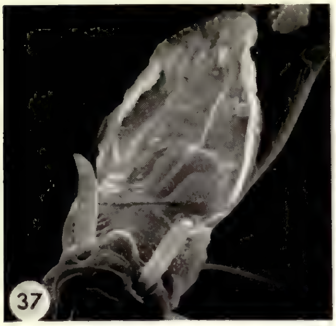
FIG. 41. *Falcomenopon* sp. Euplantula I, to show vertical striations. (Phase contrast. (T.C.)

FIG. 42. *Plegadiphilus* sp. Proximal sensillum. (S.E.M.)

FIG. 43. *Rediella mirabilis*. Head. (T.C.)

FIG. 44. *Somaphantus spencei*. Head. (T.C.)

FIG. 45. *Cuculiphilus snodgrassi*. Subterminal sensory setae of maxillary palp. (S.E.M.)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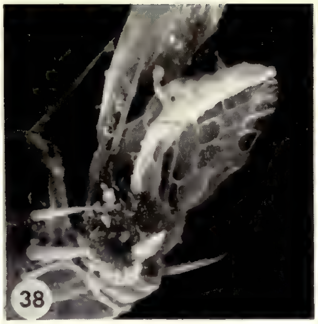
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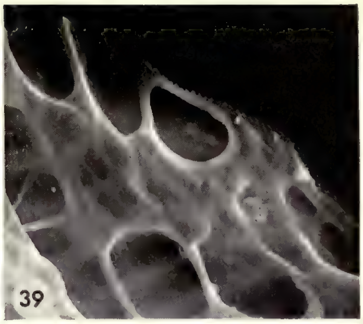
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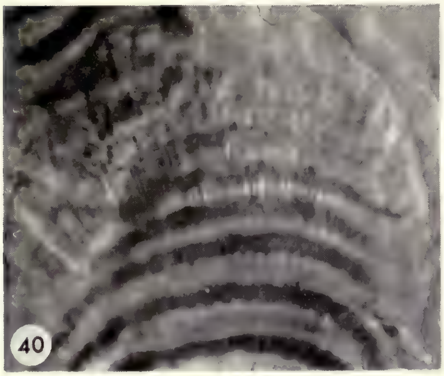
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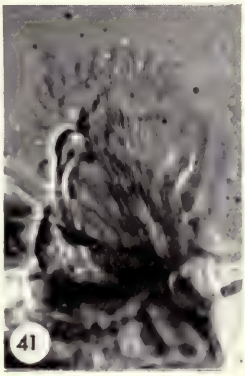
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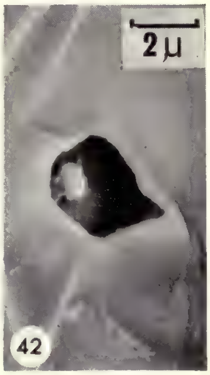

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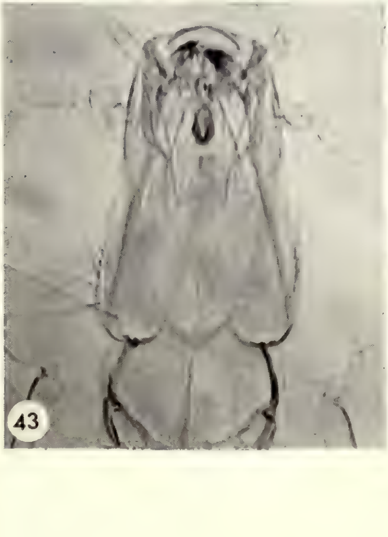
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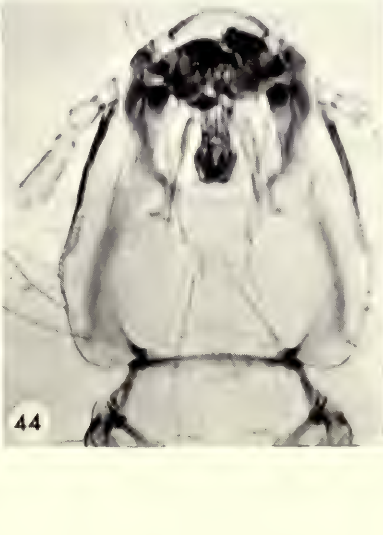
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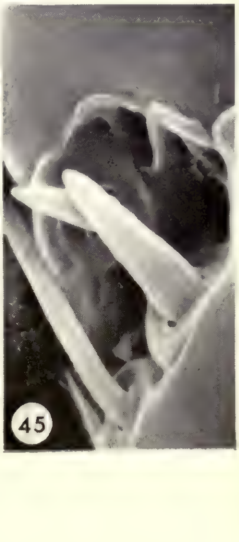
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THE TYPE-MATERIAL OF TACHINIDAE (DIPTERA) DESCRIBED BY N. BARANOV

BRITISH MUSEUM
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NATURAL HISTORY

C. W. SABROSKY
&
R. W. CROSSKEY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 2
LONDON: 1969

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NATURAL HISTORY

BY

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&

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Pp. 27–63

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 2
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Bull. Br. Mus. nat. Hist. (Ent.)

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THE TYPE-MATERIAL OF TACHINIDAE (DIPTERA) DESCRIBED BY N. BARANOV

BY

By CURTIS W. SABROSKY & R. W. CROSSKEY

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SYNOPSIS

An alphabetical catalogue is given of the 156 species and infraspecific taxa of Tachinidae described by N. Baranov, with an account of all located type-material on which the names are based. Sixty-one lectotypes are newly designated. Manuscript names of Baranov that have appeared in print, some of which have been validated by later authors, are enumerated and briefly discussed. The references given include a complete bibliography of Baranov's papers on Tachinidae.

INTRODUCTION

BETWEEN 1926 and 1942 the Slav dipterist N. Baranov—who was born in Russia but worked mainly in Jugoslavia—published a series of papers on the taxonomy of Calyptrate Diptera, many of them in rather inaccessible Yugoslav journals. In these he described and named a total of 26 genera, one subgenus, 183 species, and 17 infraspecific taxa, distributed as follows: 19 genera, one subgenus, and 145 species (plus 11 infraspecific taxa) of Tachinidae; 6 genera and 32 species (plus 6 infraspecific taxa) of Sarcophagidae; one genus and 5 species of Calliphoridae; and one species of the Muscidae. Our present paper is concerned only with the Tachinidae, the vast majority of which were described from the Oriental and Australasian Regions; Baranov described only a few taxa from the Palaearctic Region, and none from Africa or the New World. For each species-group taxon we give an account of all the type-material that we have been able to locate, but we have not attempted to assign the species to currently recognized genera or to investigate possible synonymy (this will be done by Crosskey at a later stage for the systematic catalogues of Oriental and Australasian Tachinidae in preparation).

The paper is presented in two parts: Part I contains the properly proposed and available species-group names of Baranov, and Part II contains the 32 manuscript names of Baranov that have appeared in print ; of the latter a few were cited in synonymy by Baranov himself, but most were published by someone else. Occasionally the other authors have given some descriptive matter and have thus made some of the Baranov manuscript names nomenclaturally available under the *International Code of Zoological Nomenclature*, 1961, so that authorship must be credited to them (under Article 10) and not to Baranov. However, as the names appear in the literature credited to Baranov it is desirable to account for them in the present work. In addition to the names given in Part II we have discovered, during preparation of this paper, a number of specimens in different museum collections that are sometimes labelled as types and bear manuscript names of Baranov that have never (so far as we can trace) appeared in print ; at least 23 such names are known to us, but as they are unpublished manuscript names only we are not recording them.

All names given in Parts I and II are listed alphabetically in their original combinations. For each nominal species-group taxon in Part I the entry is arranged to show the following information in the sequence indicated :—

> Name ; author ; date and page reference of original publication ; status and sex of primary type ; authority for lectotype designation (if relevant) ; data of primary type (when available in the sequence : locality, altitude, date of collection, host information, name of collector) ; type-depository ; location of genitalia in the case of male primary types (as ' genitalia *in situ* ' or ' genitalia on slide ').
>
> Number and sex of paralectotypes or paratypes, with data and depository information as for primary types. (It has not been considered necessary, however, to specify whether male genitalia are present on or removed from paralectotypes or paratypes.)
>
> Explanatory comments or annotations if considered necessary.

The type data as we record them do not necessarily conform exactly in spelling or sequence with the data labels. Geographical names are given as on the data labels (e.g. Buitenzorg and not the modern equivalent of Bogor), except for the correction of obvious misspelling and a modern terminology for sovereign states (e.g. Thailand instead of Siam). The major islands of the former Dutch East Indies are shown by their well known names such as Celebes, and not by their very new names. The names of plants and insects cited in the host information are given as on the data labels and have not been checked for their modern equivalents. Collectors' names are given with full initials when these are known, even if not all are shown on the data labels (e.g. R. J. A. W. Lever instead of R. A. Lever). Baranov spelt his own name with either a terminal ' v ' or ' ff ' in his papers on Tachinidae, but almost always used the ' ff ' ending on his type labels and determination labels ; we have not differentiated in this paper but have adopted the ' v ' ending throughout, except when quoting his labels.

Much of Baranov's type-material from H. Sauter's collecting in Formosa is labelled either ' Kankau ' or ' Kankau (Koshun) '; we have uniformly used both names as the village of Kankau (now Koko) is in the district of Koshun, with the co-ordinates 22° 00′ N. and 120° 49′ E. (locality traced from *Gazetteer* (*No.* 13) *Formosa* (*Taiwan*), U.S. Navy Department, Hydrographic Office Publication No. 393, 139 pp., 1944).

Recognition of type-material and interpretation of its status are often difficult with Baranov species, especially in the face of variant usage in both practice and publication. Certain conclusions need some discussion.

Baranov consistently placed an identification label in his handwriting on each specimen (we interpret the very few exceptions found as due to loss of labels), usually with ' n.sp. N. Baranoff ' after the specific name. However, sometimes some of such material was not mentioned in the original publication. We have felt obliged to exclude from the type-series all material that differs from that specified in the published data except where there seems to be a reasonable explanation for a discrepancy, such as a typographical error or a misread label. All such instances are annotated.

Baranov did not use the term ' holotype ' in publication or on labels, although his ' Typus ' is sometimes that. Usually ' Typus ' was not mentioned in publication, however. Some series have a ' Typus ♂ ' and a ' Typus ♀ ' and ' Cotypen ', but some have only ' Cotypen ' so far as we can discover. Occasional examples are labelled ' Paratypisches Exemplar '. We have regarded all such series as consisting of syntypes and have designated lectotypes when not already designated ; usually, when available, we have selected Baranov's ' Typus ♂ ' as the lectotype. Each lectotype has been clearly labelled as such, and 61 lectotypes are newly designated.

Hennig (1941) mentioned many of Baranov's specimens in his list of the Diptera of Formosa, but he was only a recorder of data on specimens in the Deutsches Entomologisches Institut collection and not a reviser or designator of lectotypes. His use of ' Typus ' merely indicates the presence of one specimen, as opposed to ' Typen ' for more than one ; this is clear from his multiple use of ' Typus ' under those species where there were single specimens from two or more localities. Townsend (1934–1942, *Manual of Myiology*, 12 Parts, Itaquaquecetuba) has sometimes cited ' Ht [i.e. holotype] in DEI ', but he did not see Baranov material or label specimens, and apparently he listed ' holotypes ' by assumption from the literature. If there is only one male in the series, in such a case, we have accepted, albeit reluctantly, Townsend's action as fixation of the lectotype. However, when two or more syntypes of the designated sex are available Townsend's published designation is not an ultimate restriction to a single specimen and we have then designated a lectotype.

Designation of a lectotype automatically converts all other syntypes into paralectotypes, even if they are never labelled as such and even if not conspecific with the lectotype. In Baranov's work mixed type-series rarely occur and we have recorded the few cases known to us. We have labelled all available syntypes remaining after lectotype designation as paralectotypes, even for mixed series. We should, however, comment here that there may be other paralectotypes that we have not seen, and indeed we consider this probable for the following reason : many of the species described by Baranov from an unstated number of specimens were based upon material submitted to him for identification by the Imperial (now Commonwealth) Institute of Entomology, and in the years from 1932 until 1940 he received all the material of Oriental Tachinidae coming to this Institute from British-administered territories ; this often consisted of series of reared specimens sent by departments of agriculture or forestry in India, Ceylon, Burma, Malaya, Solomon Islands, or Fiji, and undoubtedly some original specimens were returned (after identification and description) to collections in the territories of origin. It is therefore likely that some insect collections in the countries mentioned still contain specimens that are paralectotypes of species described by Baranov.

The status of certain material is sometimes difficult to determine, and we have decided each case individually. For some species an expression in the original publication such as ' Weitere Exemplare ' seems to be merely a way of recording additional type-material and we have accepted these specimens as syntypes. In other cases it seems clear to us from Baranov's words that the additional specimens cited did not form part of his type-series, nor was the description based upon them. All such cases have been annotated. Should later differences of opinion arise our lectotype designations will nevertheless stand, and any other specimens later believed to be part of the type-series will be additional paralectotypes.

Some comment is necessary on the slide preparations of male genitalia which exist in several museum collections and associate with pinned type-specimens. Baranov was one of the first workers on the Tachinidae to recognize the great value of the male genitalia for distinguishing between closely allied species, especially among the Exoristine and Goniine forms in which few other really reliable characters exist, and he frequently published figures of the genitalia drawn from permanent slide-mounts. Many of Baranov's male type-specimens have had the whole hypopygium neatly extracted and mounted on labelled glass slides, and it is usually possible to associate slides of the genitalia with the actual specimens from which they were made. In the text for each nominal taxon listed in Part I of the present work we have indicated whether the genitalia of the male primary type are *in situ* on the specimen or separately slide-mounted ; we have been able to locate the associated slides for almost all primary types from which they have been removed, but there are a very few (indicated where necessary) for which the slide-mount appears to be lost. In the course of our work it was found that several slides were still among Baranov's own collection (now in the U.S. National Museum) although the associated type-specimens were correctly located elsewhere, and in these cases the slides have now been sent to the museum collections in which the type-specimens themselves are deposited. The statement ' genitalia on slide ' given in the text for any holotype or lectotype therefore implies that the slide will be found in the same collection as the pinned primary type.

Baranov's type-material is scattered among several museum collections. The bulk of it is in London, Eberswalde (East Germany) and Washington D.C., but some type-specimens are in Bogor (Indonesia), Ottawa, Warsaw, Amsterdam, Dresden, and Brisbane. Specimens mentioned by Baranov as being located in the where Baranov formerly worked ; and we thank Dr. A. Kaltenbach for confirming museum at Stettin are now in the Zoological Institute of the Polish Academy of Sciences, Warsaw. In some of his papers Baranov has mentioned specimens in the Instituut voor Plantenziekten, Buitenzorg (now the Central Institute for Agricultural Research, Bogor) but from a detailed list of Tachinidae in the collection of that Institute (very kindly sent to us by Dr. Ida Njoman Oka : see Acknowledgements) it appears that no actual syntype specimens are present there. There are, however, several holotype, lectotype and paralectotype specimens in the Museum Zoologicum Bogoriense. Specimens mentioned by Baranov as belonging to the Imperial Institute of Entomology are in the collection of the British Museum (Natural History). To condense the text we have used the following abbreviations for the main type-depositories :

BMNH	British Museum (Natural History), London.
CNC	Canadian National Collection, Ottawa.
DEI	Deutsches Entomologisches Institut, Eberswalde.
IZPAN	Instytut Zoologiczny, Polska Akademia Nauk, Warsaw.
MZ	Museum Zoologicum Bogoriense, Bogor, Indonesia.
USNM	United States National Museum, Washington, D.C.

Baranov's own collection was acquired by the United States National Museum in 1960, and the depository abbreviation USNM is applied to material that correctly belonged in the former Baranov collection.

ACKNOWLEDGEMENTS

It gives us much pleasure to acknowledge the helpfulness and generosity of the colleagues who have assisted us with the loan of type-specimens or with valuable information in reply to our enquiries.

We are especially indebted to Dr. Günther Morge for the loan of the very large number of Baranov types, together with genitalia slides, from the collection of the Deutsches Entomologisches Institut, and to Dr. S. Somadikarta for the loan of types from the Museum Zoologicum Bogoriense, Indonesia.

For confirmation of the presence of types in other collections, and for details of their data, we are most grateful to Dr. A. Draber-Mońko (Zoological Institute, Polish Academy of Sciences, Warsaw), Dr. W. Ellis (Zoological Museum, Amsterdam), Dr. R. Hertel (Staatliches Museum für Tierkunde, Dresden), and to Mr. G. E. Shewell and Dr. D. M. Wood (Entomology Research Institute, Canadian Department of Agriculture, Ottawa). Dr. L. P. Mesnil kindly furnished us with information on a few types from the DEI collection that are temporarily in his care at the Commonwealth Institute of Biological Control, Delémont, Switzerland, and Dr. J. d'Aguilar kindly confirmed that the missing holotype of *Voria edentata* was not on loan to him.

We thank Dr. D. Mikacić, Department of Parasitology and Parasitic Diseases, Faculty of Veterinary Medicine, University of Zagreb, for confirming that so far as he can trace there are now no Baranov type-specimens in Zagreb, Yugoslavia, that none can be found in the Naturhistorisches Museum, Vienna (to which it was

thought that some material could have been moved from Zagreb during the last war).

Dr. Ida Njoman Oka provided us with a most valuable list of the Tachinidae identified by Baranov that are in the collection of the Central Agricultural Research Institute (Lembaga Pusat Penelitian Pertanian) in Bogor, Indonesia, and we take this opportunity of expressing our particular appreciation of this in view of the large amount of work that its preparation entailed.

PART I.—BARANOV'S AVAILABLE SPECIES-GROUP NAMES AND THEIR TYPES

In the following list, LECTOTYPE indicates by present designation.

Actia pulex Baranov, 1938*b* : 410. LECTOTYPE ♂, SOLOMON ISLANDS : Tulagi, 19.iii.1934, on *Cocos* flower (*R. J. A. W. Lever*) (BMNH). Genitalia *in situ*.

Paralectotypes : 1 ♂, 1 ♀, same data as lectotype (BMNH). 1 ♀, same data as lectotype (USNM).

Actia takanoi Baranov, 1935*a* : 557. LECTOTYPE ♀, PHILIPPINE REPUBLIC : Los Banos, 19.v.1928 (*S. Takano*) (USNM).

Paralectotype : 1 ♀, same data as lectotype (USNM).

Alophora albopunctata Baranov, 1935*a* : 559. Holotype ♀, JAPAN : Hokkaido, Sapporo, 17.x.1923 (*S. Takano*) (USNM).

Paratypes : 1 ♂, JAPAN : Hokkaido, Moiwa, 19.ix.1923 (*S. Takano*) (USNM) [head missing].

Argyrophylax nigrotibialis Baranov, 1935*a* : 552. Holotype ♀, FORMOSA : Koshun, Kankau, ix.1912 (*H. Sauter*) (DEI).

Paratypes : 1 ♀, same data as holotype, except date 7.viii.1912 (USNM). 1 ♀, FORMOSA : Tainan, Shinkwa, 13.vii.1926 (*S. Takano*) (USNM). 1 ♂, JAPAN : Kanazawa, 21.viii.1930 (*S. Takano*) (USNM) ; 1 ♀, same data, except date 19.viii.1930 (USNM). 1 ♂, MALAYA: Sungai Siakap, 2.iii.1930 (*H. T. Pagden*) (BMNH).

No paratypes have been traced from the China, Hangchow, locality mentioned in the original description.

Arrhinodexia eumorphophaga Baranov, 1934*a* : 48. Holotype ♂, MALAYA : Kuala Lumpur, 5.ix.1927, ex *Eumorphus marginatus* F. (*G. H. Corbett*) (BMNH). Genitalia on slide.

Arrhinomyia issikii Baranov, 1935*a* : 557. Holotype ♂, JAPAN : Yumotu, 8.viii.1934 (*S. Issiki*) (USNM). Genitalia *in situ*.

Asiocarcelia pseudocaudata Baranov, 1934*d* : 407. Holotype ♂, FORMOSA : Tainan, iv.1910 (*H. Sauter*) (USNM). Genitalia on slide.

The holotype is labelled by Baranov as 'Carcelia pseudocaudata n.sp. N. Baranoff TYPUS'.

Bactromyia crassiseta Baranov, 1938*b* : 409. Holotype ♀, AUSTRALIA : Queensland, Biloela [publ. as Biloala], 14.ii.1927 (*G. A. Currie*) (BMNH).

Bactromyia fransseni Baranov, 1934*a* : 45. Lectotype ♂, by designation of Crosskey (1963 : 6), CEYLON : Peradeniya, 8.viii.1928, pupal par. of *Psara bipunctalis* (*J. C. Hutson*) (BMNH). Genitalia on slide.

Paralectotypes : 2 ♂, 7 ♀, same data as lectotype (BMNH). 1 ♂, same data as lectotype (USNM). 1 ♀, CEYLON : Peradeniya, 21.vi.1919, ex *Nacoleia annubilala* (*J. C. Hutson*) (BMNH). 1 ♂, 1 ♀, CEYLON : Kalutara, 30.viii.1929, larval par. of *Lamprosema diemenalis* on *Calapogonium* (*J. C. Hutson*) (♂ in USNM, ♀ in BMNH). 3 ♀, JAVA : Buitenzorg, 29.iii.1932, par. on *Cnaphalocrocis medinalis* (*C. Franssen*) (two in MZ, Bogor, one in USNM).

Baranov annotated the original description as follows : 'Originalfundort Java. Cotypus ♂ in der Sammlung des Instituuts voor Plantenziekten in Buitenzorg. Cotypus ♀ in meiner Sammlung'; nevertheless we consider that the material listed before the description is part of the syntype series, as there is no evidence to show that the description has not been partly based upon it, and we hold Crosskey's (1963 : 6) designation of a lectotype from Ceylon as valid. The female 'Cotypus' from Java alluded to by Baranov as in his collection is now in the USNM (see list of paralectotypes above) and in fact bears a Baranov label reading 'Allotypus ♀'. We have been unable to confirm whether Baranov's male 'Cotypus' from Java with the date 29.iii.1932 is in the collection at Bogor (formerly Buitenzorg), but the slide of the male genitalia from this specimen is at present in the USNM collection.

Bactromyia fransseni solomonica Baranov, 1938*a* : 170. LECTOTYPE ♂, SOLOMON ISLANDS : Russell Island, vi.1932 (*R. J. A. W. Lever*) (BMNH). Genitalia on slide.

Paralectotype : 1 ♂, same data as lectotype (USNM).

There was no evidence from the original description of *solomonica* that Baranov had more than one specimen, and Crosskey (1963 : 7) assumed that the single specimen in the BMNH collection was the holotype. It has now been found that Baranov's collection in the USNM contains a second specimen with identical data, so that present designation of a lectotype is necessary (see above). The lectotype is in poor condition with loss of one wing, several legs, and the abdomen is separately card-mounted ; Baranov's original label on the lectotype reads ' solomonicola ', but *solomonica* was the published spelling.

Bezziomyiobia nigripes Baranov, 1938*a* : 172. Holotype ♀, SOLOMON ISLANDS : Tulagi, 16 [publ. as 6]. xii.1934 (*R. J. A. W. Lever*) (BMNH).

Blepharipoda eutachinoides Baranov, 1932*a* : 92. LECTOTYPE ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotype : 1 ♂, same data as lectotype (USNM).

Cadurcia leefmansi Baranov, 1933 : 153. Holotype (as ' Protograph ', figured specimen) ♂, JAVA : Buitenzorg, ex caterpillar of *Brachartona catoxantha* Hampson (*Leefmans*) (probably lost, whereabouts not traced, but slide-mount of genitalia in USNM).

Paratypes : 1 ♂, 1 ♀, same data as holotype (USNM). 1 ♂, same data as holotype (MZ, Bogor).

This species was described from five specimens of both sexes (number of each not specified), of which one male was referred to by Baranov as the ' Protograph ' and the other four as ' Cotypen '. The unfamiliar term ' protograph ' as used by Baranov is clearly equivalent to holotype and refers to the single specimen from which the illustration of the male genitalia was drawn (after removal of the hypopygium) ; this specimen was stated by Baranov to be in the Instituut voor Plantenziekten in Buitenzorg, Java (now the Lembaga Pusat Penelitian Pertanian, Bogor) and the slide preparation of its genitalia in his own collection. The ' Protograph ', i.e. holotype, specimen cannot now be found in this institution in Bogor, or at the Museum Zoologicum Bogoriense, and it is not among Baranov's own collection, and must be considered probably lost ; but the slide of the genitalia, labelled ' Protograph ', from Baranov's own collection, is present in the U.S. National Museum.

Of the ' Cotypen ' specimens (i.e. paratypes) two are in USNM collection and one (a complete but teneral male) has been located in the Museum Zoologicum Bogoriense. Baranov noted in the original publication that *C. leefmansi* had earlier been identified by Bezzi as ' Degeeria albiceps Macquart ', and the paratype specimens in USNM and MZ all bear this name as well as Baranov's original labels.

In an earlier work Crosskey (1963) referred to four syntypes of *Cadurcia leefmansi* in error : as noted above, there were five original specimens of which one is acceptable as holotype.

Cadurcia vanderwulpi Baranov, 1938*b* : 410. Holotype ♀, INDIA : U. P., Haldwani, Chakrata Range, 4 [publ. as 18].vi.1930, ex pupa of *Hapalia machaeralis* (*S. N. Chatterjee*) (BMNH).

Baranov published the name *vanderwulpi* as a ' nom. nov. ' for the misidentified ' *Argyrophylax zetterstedti*, v. d. Wp., nec. B. B., nec Villeneuve '. It is not a replacement name for a junior homonym, but is an available name for a nominal species based upon the three-line description given by Baranov ; the sole cited specimen (data above) is the holotype.

Calotheresia (Calotheresiopsis) orientalis Baranov, 1932*e* : 214. Holotype ♂, CELEBES : Tomboekoe [publ. as Tomboegoe] (USNM). Genitalia on slide.

Carcelia aberrans Baranov, 1931*a* : 27. Holotype ♂, FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Carcelia buitenzorgiensis Baranov, 1931*a* : 45. Lectotype ♂, by designation of Crosskey (1967*b* : 103), JAVA : Buitenzorg, 1919 (*W. Roepke*) (USNM). Genitalia on slide.

Paralectotypes : 2 ♂, same data as lectotype (BMNH & USNM : USNM specimen represented by genitalia slide only).

Carcelia caudata Baranov, 1931*a* : 41. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype, except date ix.1912 (USNM). 1 ♂, FORMOSA : Toa Tsui Kutsu, v.1914 (*H. Sauter*) (DEI).

Carcelia caudatella Baranov, 1932*d* : 1. Holotype ♂, SUMATRA : Siberut Island, ix.1924 (*C. B. K. & N. S.*) (MZ, Bogor). Genitalia on slide.

The Baranov collection in USNM contains a male specimen of *caudatella* labelled by Baranov as ' n.sp. ', but it has the data ' Karimen Djawa, v.1926 (Dammerman) ' (not cited in the original publication) and is not a type-specimen.

Carcelia distincta Baranov, 1931*a* : 32. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

At the time of writing the holotype is temporarily in the collection of Dr. L. P. Mesnil, at Delémont, Switzerland.

Carcelia frontalis Baranov, 1931*a* : 43. Holotype ♂, FORMOSA : Toa Tsui Kutsu, v.1914 (*H. Sauter*) (DEI). Genitalia on slide.

Carcelia hirsuta Baranov, 1931*a* : 38. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotype : 1 ♂, same data as lectotype, except date 7.vii.1912 (DEI) [abdomen missing].

Carcelia malayana Baranov, 1934*d* : 404. Holotype ♂, MALAYA : Malay Peninsula, Kuala Lumpur, 2.v.1932 (BMNH). Genitalia on slide.

Carcelia octava Baranov, 1931*a* : 35. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, ix.1912 (*H. Sauter*) (DEI). Genitalia *in situ*. Lectotype designated from ' *octava* A ', see discussion below.

Paralectotypes : 1 ♀, same data as lectotype (USNM). 3 ♂, same data as lectotype (one in DEI, two in BMNH). 1 ♂, same data as lectotype, except date 7.viii.1912 (USNM). 3 ♂, same data as lectotype, except date viii.1912 (DEI). 1 ♂, same data as lectotype, except date 7.ix.1912 (DEI). 2 ♂, same data as lectotype, except date iv.1912 (DEI). 1 ♀, same data as lectotype, except date iii.1913 (DEI). 1 ♀, same data as lectotype, except date 22.vi.1912 (BMNH).

Baranov described *octava* in two forms, A and B. The lectotype and all above-listed paralectotypes are of ' form A ' and are so labelled by Baranov. The DEI collection contains in addition one paralectotype of ' form B ', labelled as such by Baranov, and with the same data as the lectotype, except for the date viii.1912.

Carcelia pilosa Baranov, 1931*a* : 29. LECTOTYPE ♂, JUGOSLAVIA : Bosnia, Sarajevo (USNM). Genitalia on slide.

We have not seen the second original syntype, locality unknown to us, stated by Baranov to be in the Riedel collection, but Mesnil (1944 : 29) has noted that it is very close to *Carcelia excisa* (Fallén).

Carcelia pilosella Baranov, 1931*a* : 37. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.vii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype, except date vi.1912 (USNM). 1 ♀, same data as lectotype, except date ix.1912 (DEI).

Carcelia prima Baranov, 1931*a* : 31. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 22.vi.1912 (*H. Sauter*) (DEI). Genitalia *in situ*. Lectotype designated from ' *prima* B ', see following discussion.

Paralectotypes : Form *prima* B : 1 ♂, same data as lectotype (DEI). 1 ♂, same data as lectotype, except date vii.1912 (DEI). 1 ♂, same data as lectotype, except date viii.1912 (USNM). 2 ♂, same data as lectotype, except date ix.1912 (USNM & BMNH). Form *prima* A : 1 ♂, same data as lectotype (DEI). 2 ♂, same data as lectotype, except date iv.1912 (DEI). 1 ♀, same data as lectotype, except date vi.1912 (USNM). 3 ♀, same data as lectotype, except date viii.1912 (two in DEI, one in BMNH). 1 ♂, same data as lectotype, except date 7.viii.1912 (DEI). 1 ♂, 2 ♀, same data as lectotype, except date ix.1912 (DEI). 1 ♂, same data as lectotype, except date 7.ix.1912 (DEI). 1 ♂, same data as lectotype, except date 7.xi.1912 (DEI). 11 ♂, FORMOSA : Sokutsu, ix.1912 (six in DEI, three in BMNH, two in USNM). 1 ♂, 1 ♀, FORMOSA : Taihorinsho, ix.1909 (DEI) ; 1 ♀, same data (USNM).

In the original description Baranov treated *Carcelia prima* as two forms, *prima* A in which there are two reclinate orbital setae and *prima* B in which there is only one reclinate orbital seta ; he did not state the number of specimens of either form, but the specimens we have located and recorded above must represent most of the original syntype material for both forms. In a later paper Baranov (1934*d* : 396–397) considered A and B to be distinct species and he retained the name *prima* for the species represented by B ; we have therefore selected a specimen of form B as the lectotype of *Carcelia prima* (see above). Baranov (1934*d*) treated his form A in synonymy with *Eucarcelia kockiana* (Townsend), but we are not able to say at this time whether this is correct.

We have not seen the specimen of *prima* A from Tsingtau cited by Baranov in the original publication, but this will be another paralectotype if it is ever located.

It should be noted that the female paralectotype from Taihorinsho in the DEI collection is wrongly associated and has the hind coxa bristled and a ventral submedian seta on the middle tibia (in all the other material the hind coxa is bare and the mid tibia lacks a *v* submedian seta). The lectotype, all paralectotypes from *prima* B, and most of the paralectotypes from *prima* A, have the basicosta a clear yellow-orange colour, but in some of the paralectotypes of *prima* A the basicosta is darker and distinctly browned on the fore margin (so it is possible that *prima* A paralectotypes could be an admixture of specimens from two very closely allied species). The lectotype and paralectotypes of *prima* B have only one pair of reclinate orbital setae, and the paralectotypes of *prima* A have two pairs of reclinate orbital setae, but it is not fully certain, despite Baranov's (1934*d*) treatment, whether this is evidence that two species are involved.

Carcelia quarta Baranov, 1931*a* : 33. Holotype ♂, FORMOSA : Gebiet des Sh'shastammes, v–vi.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Carcelia quinta Baranov, 1931*a* : 33. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, ix.1912 (*H. Sauter*) (DEI). Genitalia *in situ*. Lectotype designated from '*quinta* A', see discussion below.

Paralectotypes : 1 ♂, same data as lectotype, except date 7.xi.1912 (BMNH). 1 ♂, same data as lectotype, except date 22.vi.1912 (USNM). 1 ♂, same data as lectotype, except date vi.1912 (DEI).

Baranov described *quinta* in two forms, A & B, defined by differences in the relative widths of the interfrontal area and parafrontals ; the number of original specimens of each form was not stated, but so far as we can tell the four specimens cited above form the complete type-series for both forms. The lectotype and each of the paralectotypes in USNM and BMNH is labelled by Baranov as '*quinta* A', and the paralectotype in DEI collection is labelled by Baranov as '*quinta* B'.

Carcelia rasella Baranov, 1931*a* : 44. LECTOTYPE ♂, JUGOSLAVIA : Serbia, Golubac. 1.v.1927 (USNM). Genitalia on slide.

Paralectotypes : 2 ♂, same data as lectotype (USNM).

Carcelia rasoides Baranov, 1931*a* : 42. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 22.vi.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype (DEI). 2 ♂, same data as lectotype, except date ix.1912 (DEI & BMNH).

Carcelia rufa Baranov, 1931*a* : 33. LECTOTYPE ♂, FORMOSA : Macuyama, vi.1914 (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotypes : 3 ♂, FORMOSA : Koshun, Kankau, 7.v.1912 (*H. Sauter*) (DEI, USNM & BMNH) ; 1 ♀, same data (DEI). 1 ♂, FORMOSA : Koshun, Kankau, 22.vi.1912 (*H. Sauter*) (DEI) ; 1 ♀, same data (USNM).

Carcelia rutilloides Baranov, 1931*a* : 29. Holotype ♀, FORMOSA : Chosokei, 1914 (*H. Sauter*) (DEI).

Carcelia secunda Baranov, 1931*a* : 31. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Carcelia septima Baranov, 1931*a* : 35. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, viii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♀, same data as lectotype (BMNH). 1 ♀, same data as lectotype, except date ix.1912 (DEI).

Carcelia setosella Baranov, 1931*a* : 44. Holotype ♂, FORMOSA : Sokutsu, v.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Carcelia sexta Baranov, 1931*a* : 34. Holotype ♂, FORMOSA : Taihorinsho, ix.1909 (*H. Sauter*) (DEI). Genitalia on slide.

Carcelia tertia Baranov, 1931*a* : 32. Holotype ♂, FORMOSA : Taihorinsho, ix.1909 (*H. Sauter*) (DEI). Genitalia on slide.

Catacarcelia rondaniella Baranov, 1934*d* : 392. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.vii.1912 (*H. Sauter*) (USNM). Genitalia on slide.

Paralectotypes : 1 ♂, FORMOSA : Takao, 19.xii.1907 (*H. Sauter*) (USNM). 1 ♀, same data as lectotype (USNM).

The two paralectotypes each bear a label with the manuscript name ' Exorista carcelioides Baranov n.sp. ' and a second label ' Carcelia rondaniella n.sp. N. Baranoff ', both in Baranov's writing.

Chaetexorista solomonensis Baranov, 1936 : 101. Holotype ♂, SOLOMON ISLANDS : Shortland, Korovo, 23.iv.1934 (*H. T. Pagden*) (BMNH). Genitalia *in situ*.

Chaetoptiliopsis burmanica Baranov, 1938*b* : 411. Holotype ♂, BURMA : Northern Shan States, Panghai Res., Namtu, R.O., 26.v.1934, ex *C.* [*alopepla*] *leayana* (BMNH). Genitalia *in situ*.

Paratype : 1 ♀, same data as holotype, except date 25.v.1934 (BMNH).

The USNM Collection contains a male and a female from the same rearing, with similar data except for the date 28.v.1934, but these are not recorded in the original description and are not type-material.

Senior White, Aubertin & Smart (1940 : 82) erroneously placed this genus and species in the Calliphoridae.

Cnephalia sillemi Baranov, 1935*c* : 407. Holotype ♂, CHINA : Sinkiang, Karakorum Range, Karakash Valley, between Kawak Pass and Sanju Pass [approx. 36° 30′ N. and 78° 15′ E.], 3700–3200 m, 16.ix.–5.x.1929 (*J. A. Sillem*) (Zoölogisch Museum, Amsterdam). Genitalia *in situ*.

Ctenophoroceropsis yerburyi Baranov, 1938*b* : 409. Holotype ♂, SOUTH YEMEN REPUBLIC : Aden, 21.ii.1895 (*Yerbury*) (BMNH). Genitalia *in situ*.

Paratypes : 1 ♂, same data as holotype (BMNH). 2 ♂, same data as holotype, except dates 9.ii.1895 and 26.ii.1895 (BMNH) (both headless). 1 ♂, same data as holotype, except date 20.ii.1895 (USNM).

Dexiomimops rufipes Baranov, 1935*a* : 557. Holotype ♂, JAPAN : Maoka, Karafuto, 21.viii.1923 (*S. Takano*) (USNM). Genitalia *in situ.*

The Baranov collection in USNM contains two males from Formosa (no other data) that are here not considered to be part of the type-series. After listing the type, Baranov stated ' Auch von Formosa mir bekannt ', without giving details and without clearly including the specimens in his type-series.

Doleschalla solomonensis Baranov, 1934*b* : 182. Holotype ♂, SOLOMON ISLANDS : Guadalcanal, Lunga, iv.1932 (*R. J. A. W. Lever*) (BMNH). Genitalia *in situ.*

Paratypes : 1 ♂, SOLOMON ISLANDS : Tulagi, 23.vii.1933 (*R. J. A. W. Lever*) (BMNH) ; 1 ♂, same data, except date 30.vii.1933 (USNM).

Baranov (1934*c* : 475), in a second paper in the same month (August 1934), published records of four males of *D. solomonensis*, giving two localities not mentioned for the original series ; these males appear to be additional material, and are presumed to be not type-material. In this second paper (Baranov, 1934*c*) there is a figure of the male genitalia, but no diagnosis in words, and under the *International Code of Zoological Nomenclature*, 1961 (Article 13a (i)) the name *solomonensis* would be nomenclaturally unavailable from this second paper even if it should be found to be the earlier of the two publications.

Dolichocolon australe Baranov, 1938*b* : 405. LECTOTYPE ♂, AUSTRALIA : Queensland, Gympie, iii.1932, ex *Spodoptera exempta* (*W. H. T. Summerville*) (BMNH). Genitalia *in situ.*

Paralectotypes : 1 ♀, same data as lectotype (BMNH). 1 ♂, 1 ♀, same data as lectotype (USNM). 2 ♀, AUSTRALIA : Queensland, Gadgarra, 6.ii.1932, ex *Spodoptera* (*J. Harold Smith*) (USNM).

Dolichocolon orbitale Baranov, 1938*b* : 406. LECTOTYPE ♂, INDIA : C.P., Rahatgaon, Hoshangabad, 25.ix.1926, ex *Hapalia machaeralis* (*S. N. Chatterjee*) (BMNH). Genitalia *in situ.*

Paralectotypes : 1 ♂, same data as lectotype, except date 4.x.1926 (USNM). 1 ♂ (genitalia slide only), same data as lectotype, except date 16.viii.1926 (USNM). 1 ♀, same data as lectotype, except date 16.viii.1926 (USNM). 1 ♀, same data as lectotype, except date 2.x.1926 (BMNH).

Beeson & Chatterjee (1935 : 173) had already published this name, prior to Baranov's description, and had given a figure of the entire fly together with an account of the life history, but these authors gave no description and the name is therefore nomenclaturally unavailable from Beeson & Chatterjee (1935) under Article 13a (i) of the *International Code of Zoological Nomenclature*, 1961.

Dolichocolon quadrisetosum Baranov, 1935*a* : 555. LECTOTYPE ♀, FORMOSA : Koshun, Kankau, vii.1912 (*H. Sauter*) (DEI).

Paralectotypes : 1 ♀, same data as lectotype, except date 7.vii.1912 (DEI). 3 ♀, same data as lectotype, except date 7.viii.1912 (two in USNM, one in DEI). 2 ♂, FORMOSA : Takao, 31.x. and 8.xii.1907 (*H. Sauter*) (USNM). 1 ♀, FORMOSA : Takao, 8.xii.1907 (*H. Sauter*) (IZPAN, Warsaw).

We accept the two males from Takao (in USNM collection) as syntypes as they are labelled as ' n.sp. ' by Baranov, but it should be noted that only the female was mentioned in the original description. We have not seen the Formosan specimen with the data ' Shinkwa, 12.iv.1932 (S. Takano) ' mentioned by Baranov, but this will be another paralectotype if ever located.

Dolichocolon rufescens Baranov, 1938*b* : 406. LECTOTYPE ♂, AUSTRALIA : New South Wales, Yantabulla, 25.v.1916 (BMNH). Genitalia *in situ.*

Paralectotype : 1 ♂, same data as lectotype, except date 25.vi.1916 (*Siddens*) (USNM).

Echinomyia praeceps aestivalis Baranov, 1929*a* : 14. LECTOTYPE ♀, JUGOSLAVIA : Macedonia, Kavadar, 15.vi.1927 (USNM).

Paralectotypes : 1 ♀, same data as lectotype, except date 19.vii.1927 (USNM). 1 ♂, same data as lectotype, except date 5.vii.1927 (CNC). 1 ♀, same data as lectotype, except date 5.vii.1927 (USNM). 1 ♂, JUGOSLAVIA : Macedonia, Skoplje, 11.ix.1928 (CNC).

We accept Baranov's 'cotypus' specimens from Kavadar with the date 5.vii.1927 as paralectotypes, but it should be noted that in the original publication Baranov cited this date for specimens from Skoplje : we consider that Baranov probably made a slight error in recording the data. Baranov noted specimens from Belje (22.vi.–5.vii.1923), Bitol (9.ix. 1928) and Struga (7.ix.1928) in the original publication but none of these have been located ; they will be additional paralectotypes when found.

Echinomyia praeceps vernalis Baranov, 1929*a* : 13. LECTOTYPE ♂, JUGOSLAVIA : Serbia, Golubac, 9.v.1927 (USNM). Genitalia *in situ*.

Paralectotypes : 2 ♂, same data as lectotype (USNM & CNC).

The specimens from Skoplje (14.iv. & 17.v.1927) and Topčider (8 & 14.v.1924) mentioned in the original publication have not been located, but will be additional paralectotypes if later found.

Erycia bezzii Baranov, 1934*a* : 44. LECTOTYPE ♀, MALAYA : Kuala Lumpur, 24 [publ. as 29].viii.1931, ex *Telicota palmarum* Moore (BMNH).

Paralectotype : 1 ♀, same data as lectotype (USNM).

There was no evidence from the original description of *bezzii* that Baranov had more than one specimen, and Crosskey (1967*b* : 103) cited the specimen in BMNH collection as holotype. It has now been found that Baranov's collection in USNM contains a second specimen with identical data, so that present designation of a lectotype is necessary (see above).

Erycia intermedia Baranov, 1939 : 111. Holotype ♀, JAPAN : Hokkaido, Sapporo, 13.viii. 1923 (*K. Tamanuki*) (USNM).

Erycia nigricosta Baranov, 1936 : 99. Holotype ♂, SOLOMON ISLANDS : Guadalcanal, Kaukau [publ. as Kankau], 22.viii.1934 (*R. J. A. W. Lever*) (BMNH). Genitalia on slide.

Erycia nymphalidophaga Baranov, 1936 : 112. LECTOTYPE ♂, INDIA : U.P., Dehra Dun, 5.x.1929, ex nymphalid on *Citrus aurantium* (*N. C. Chatterjee*) (BMNH). Genitalia *in situ*.

Paralectotypes : 3 ♀, same data as lectotype, except dates 6, 10 and 11.x.1929 (BMNH). 1 ♀, same data as lectotype, except date 10.x.1929 (USNM).

Beeson & Chatterjee (1935 : 174) published this name prior to Baranov's description, but gave only a three-line note on the life history and no description ; the name is nomenclaturally unavailable from Beeson & Chatterjee (1935) under Article 13a (i) of the *International Code of Zoological Nomenclature*, 1961.

Erycia palpata Baranov, 1936 : 113. Holotype ♀, FORMOSA : Toa Tsui Kutsu, v.1914 (*H. Sauter*) (USNM).

Erycia rufofemorata Baranov, 1936 : 112. Holotype ♀, JAVA : Buitenzorg, ii.1933 (*R. W. Paine*) (BMNH).

Paratype : 1 ♀, same data as lectotype, except date i.1933 (USNM).

Erycia takanoi Baranov, 1939 : 111. LECTOTYPE ♂, JAVA : Pasoeroean, iii.1926 (*S. Takano*) (USNM). Genitalia *in situ*.

Paralectotype : 1 ♀, same data as lectotype (USNM).

Eucarcelia caspica Baranov, 1934*d* : 390. Holotype ♂, ? U.S.S.R. or IRAN : Caspian Sea region, Talysch [? = Talish], 1897 (*Korb*) (USNM). Genitalia on slide.

Eucarcelia dammermani Baranov, 1934*d* : 393. LECTOTYPE ♂, JAVA : Idjen, 1850 m, Ongop-Ongop, v.1924 (*Dammerman*) (USNM). Genitalia on slide.

Paralectotype : 1 ♀, same data as lectotype (MZ, Bogor).

Eucarcelia grossa Baranov, 1934*d* : 393. Holotype ♂, FORMOSA : Tainan, iv.1910 (*H. Sauter*) (USNM). Genitalia on slide

Eucarcelia indica Baranov, 1934*d* : 394. Holotype ♂, India : Silhar Kalhar, 27.vi.1911 (USNM). Genitalia on slide, head missing.

Eurystaea leveriana Baranov, 1934*b* : 182. Holotype ♀, Solomon Islands : Malaita, Su'u, iv.1933 (*R. J. A. W. Lever*) (BMNH).

Eutachina argenteostriata Baranov, 1938*a* : 171. Holotype ♀, Solomon Islands : Guadalcanal, Kovagombi, 1.v.1936 (*R. J. A. W. Lever*) (BMNH).

Eutachina aureifrons aureifrons Baranov, 1936 : 107. LECTOTYPE ♂, Java : Idjen, Kendeng, 1400 m, iii.1924 (*Dammerman*) (MZ, Bogor). Genitalia *in situ*.

Paralectotype : 1 ♂, Java : Idjen, Blawan, 950 m, vi.1924 (*Dammerman*) (USNM).

In the original description Baranov cited the locality simply as ' Java ' without additional data, and stated ' Typus im Zoologischen Museum in Buitenzorg '. The collection of the Zoological Museum in Bogor contains one male specimen but it is actually labelled as ' Paratypus ', and the male specimen in USNM collection is labelled as ' Typus '; however, the slide preparation of the genitalia from the USNM collection is labelled as ' Cotypus ' and not as ' Typus '. We consider that the two males are syntypes, and the specimen in MZ, Bogor has been designated as lectotype to conform with Baranov's statement of the depository.

The USNM collection contains a female specimen with the same data as the lectotype (except that the date is given ambiguously as both iii and vi), but as only the male sex was mentioned in the description and as the female specimen is labelled as ' aureifrons mihi N. Baranoff ' (i.e. not with an original ' n.sp. ' label) we consider that it is not an original syntype.

Eutachina aureifrons sumatrana Baranov, 1936 : 107. LECTOTYPE ♂, Sumatra : Selemoekae, viii.1925 (*O. Posthumus*) (USNM). Genitalia on slide.

Paralectotype : 1 ♂, Sumatra : Goen-mongko, 7.viii.1925 (*O. Posthumus*) (USNM).

Eutachina aureisquamosa Baranov, 1938*b* : 410. Holotype ♂, Solomon Islands : Guadalcanal, Oreke, 700 ft., 14.xii.1934 (*R. J. A. W. Lever*) (BMNH). Genitalia *in situ*.

Eutachina aurichalcea Baranov, 1936 : 100. Holotype ♀, Bougainville Island : Kieta, v.1934 (*J. L. Froggatt*) (BMNH).

Eutachina basalis Baranov, 1932*a* : 86. Holotype ♂, Formosa : Koshun, Kankau, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Eutachina civiloides Baranov, 1932*a* : 84. LECTOTYPE ♂, Formosa : Koshun, Kankau, vii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, 1 ♀, same data as lectotype, except date 7.viii.1912 (USNM & DEI).

Eutachina fuscipennis Baranov, 1932*a* : 90. LECTOTYPE ♂, Formosa : Koshun, Kankau, viii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♂, same data as lectotype, except date iv.1912 (DEI).

The DEI collection contains two females from Kankau, date ix.1912, determined by Baranov as *fuscipennis*, but these are not part of the original type-series.

Eutachina hyalipennis Baranov, 1932*a* : 88. LECTOTYPE ♂, Formosa : Chipun, vii. 1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, Formosa : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI) ; 1 ♂, same data, except date ix.1912 (USNM).

A female specimen determined by Baranov as *hyalipennis* and having similar data (Kankau, vi.1912) is in DEI collection but is not an original syntype.

Eutachina ladelli Baranov, 1936 : 108. Holotype ♂, Thailand : Hua Hin, iv.1926 (*W. R. S. Ladell*) (BMNH). Genitalia on slide.

Eutachina mungomeryi Baranov, 1938*b* : 410. LECTOTYPE ♂, AUSTRALIA : Queensland, Gordonvale, 2.iii.1936, ex *Laphygma exempta* Walker (*R. W. Mungomery*) (BMNH). Genitalia *in situ*.

Paralectotypes : 1 ♀, same data as lectotype (BMNH). 1 ♂, same data as lectotype (USNM). 1 ♀, same data as lectotype, except collector (*I. W. Buzacott*) (USNM).

Eutachina quadriseta Baranov, 1932*a* : 91. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Baranov (1938*a* : 171) later recorded specimens from the Solomon Islands as *Eutachina quadrisetosa* Bar. and compared them with Formosan *quadrisetosa*, but this is a *lapsus* and clearly an erroneous subsequent spelling of *quadriseta* Baranov.

Eutachina rusticella Baranov, 1936 : 108. LECTOTYPE ♂, FORMOSA : Takao, 28.xi.1907 (*H. Sauter*) (IZPAN, Warsaw). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♂, SUMATRA : [no other locality data] 8.ix.1930 (USNM : genitalia preparation only).

In the original description Baranov recorded ' Sumatra (Imperial Institute of Entomology) ' among the original material seen, and there must therefore have been at least one syntype from Sumatra. We have been unable to locate a complete specimen from Sumatra, but the Baranov collection in USNM contains a slide preparation of the male genitalia of a specimen of *rusticella* labelled by Baranov as from Sumatra, with the date 8.ix.1930, and with the abbreviated words ' Imper. Inst. ', and we consider this slide to confirm that there was at least a male syntype from Sumatra ; we therefore record it above as one of the paralectotypes. Tachinid material handled by Baranov from the Imperial (now Commonwealth) Institute of Entomology was normally deposited in the British Museum (Natural History) collection or returned to the sender, but in this case (as the body of the syntype has not been found) the genitalia slide preparation is retained in the USNM collection, whence it can be returned if the associated specimen is found.

The USNM collection also contains a male specimen of *rusticella* from the same locality as the lectotype, but with the date 6.xii.1907 ; this date does not fit with the original published data and the specimen is considered not to be a syntype.

Eutachina tenuiforceps Baranov, 1932*a* : 87. Holotype ♂, FORMOSA : Koshun, Kankau, vii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

The DEI collection contains three females from Kankau determined by Baranov as *tenuiforceps*, but this species was described only from the male and these females are not original type-material (though listed as ' Typen ' by Hennig, 1941 : 194).

Euthelairosoma siamense Baranov, 1938*b* : 411. Holotype ♂, THAILAND : Siam [also bearing some other undecipherable data] (BMNH). Genitalia *in situ*.

Euvespivora orientalis Baranov, 1942 : 162. Holotype ♂, JAVA : Delawa, 10.v.1937, teak forest ex larva of *Vespa analis* (*L. G. E. Kalshoven*) (USNM). Genitalia *in situ*.

Euvespivora salomonica Baranov, 1942 : 163. Holotype ♀, SOLOMON ISLANDS : Tulagi, 17.ii.1938 (*R. J. A. W. Lever*) (BMNH).

Exorista distincta Baranov, 1931*b* : 120. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.xi.1912 (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♂, same data as lectotype, except date 7.viii.1912 (BMNH). 2 ♀, same data as lectotype, except date 7.viii.1912 (DEI & USNM). 1 ♀, same data as lectotype, except date ix.1912 (BMNH).

In the original publication Baranov mentioned a total of five specimens (2 ♂, 3 ♀) but did not mention the month date ' xi '. We have traced a total of six specimens (see above), two of which have the month date ' xi '; all are labelled as ' n.sp. ' by Baranov and we consider all to be original syntypes. We consider the discrepancies to be due to inadvertent lapse by Baranov in recording the material.

Exorista phrynoides Baranov, 1939 : 110. Holotype ♂, JAPAN : Hokkaido, Sapporo, 22.vi.1924 (*S. Takano*) (USNM). Genitalia *in situ*.

Exorista picta Baranov, 1935*a* : 553. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.vii.1912 (*H. Sauter*) (DEI). Genitalia *in situ.*

Paralectotypes : 1 ♀, same data as lectotype (BMNH). 2 ♂, same data as lectotype, except date ix.1912 (DEI & USNM). 2 ♀, same data as lectotype, except date ix.1912 (DEI). 1 ♂, same data as lectotype, except date vii.1912 (DEI). 1 ♂, same data as lectotype, except date 4.viii.1912 (USNM). 1 ♂, 1 ♀, same data as lectotype, except date 7.viii. 1912 (BMNH). 1 ♀, same data as lectotype, except date 7.xi.1912 (USNM). 3 ♀, FORMOSA : Tainan, v.1912 (*H. Sauter*) (DEI). 1 ♀, FORMOSA : Shinkwa, 19.vi.1932 (*S. Takano*) (USNM).

Exorista quadrimaculata Baranov, 1934*a* : 43. Lectotype ♂, by designation of Crosskey (1967*b* : 104), MALAYA : Klang, 9.ii.1931 (BMNH). Genitalia *in situ.*

Paralectotypes : 1 ♀, same data as lectotype (BMNH). 1 ♂, 1 ♀, MALAYA : Estate K. Lipis, 30.iv.1931, host Psychidae ? *Clania variegata* (*G. H. Corbett*) (USNM). 1 ♂, SUMATRA : E.C., Pematang Siantar, 13.i.1932 (*R. I. Nel*) (BMNH) ; 1 ♂, same data, except date 21.xi. 1931 (USNM). 1 ♂, CEYLON : Ratnapura, 27.vi.1922, ex psychid (*J. C. Hutson*) (BMNH).

Although Baranov headed the original description of *quadrimaculata* with a '♂' sex symbol only, we have accepted two female specimens as part of the original syntype series and have listed them as paralectotypes above. Our reasons for this are, firstly, that these females have similar data to the males and bear Baranov's usual type of 'n.sp.' label ; and, secondly, that elsewhere in the same paper Baranov has introduced a note on the 'Weibchen' in descriptions headed '♂' only, in such a way that the descriptions *appear* to be based only on the male but were actually drawn from both sexes. We therefore infer that Baranov had both sexes before him but that the symbol '♀' was inadvertently omitted.

Exorista seniorwhitei Baranov, 1938*b* : 408. Holotype ♂, INDIA : [Assam] Khasia Hills, Mawphlang [publ. as Mauphlong], 10.x.1920 (*R. Senior-White*) (BMNH). Genitalia *in situ.*

Paratype : 1 ♂, INDIA : [Assam, Khasia Hills] Laitlyngkot, 16.x.1920 (*R. Senior-White*) (USNM).

The localities of the type-material are not easy to trace in atlases, but are mentioned by Senior-White (1922) in his paper on the Diptera of the Khasia Hills.

Exorista vicinalis Baranov, 1931*b* : 123. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, viii [publ. as vii].1912 (*H. Sauter*) (USNM).

Paralectotype : 1 ♀, same data as lectotype (USNM).

The lectotype lacks the genitalia and the slide preparation has not been located.

Fabriciella pandellei Baranov, 1929*a* : 19. LECTOTYPE ♂, JUGOSLAVIA : Bosnia, Trebevie (USNM). Genitalia *in situ.*

Paralectotype : 1 ♂, JUGOSLAVIA : Croatia, Sejeme, 19.vi.1918 (USNM).

In addition to the two specimens above mentioned the USNM collection contains a male specimen with data 'Sejeme, Croatia, 2.viii.1929', but this is not considered to be an original syntype ; Baranov's description mentions only specimens with month dates 'VI.–VII.' and collection in August would probably be too late for citation of the material in a paper published in the same year.

Formosia mirabilis solomonicola Baranov, 1936 : 101. LECTOTYPE ♂, SOLOMON ISLANDS : Guadalcanal, Kaukau [publ. as Kankau], 21.viii.1934 (*R. J. A. W. Lever*) (BMNH). Genitalia *in situ.*

Paralectotypes : 1 ♀, BOUGAINVILLE [publ. as Guadalcanal] : Kieta, v.1934 (*J. L. Froggatt*) (BMNH). 1 ♂, 1 ♀, SOLOMON ISLANDS : New Georgia, Segi, Morovo Lagoon, 5.v.1934 (*H. T. Pagden*) (USNM). 1 ♀, SOLOMON ISLANDS : Tulagi, Ridge, 31.iii.1934 (*H. T. Pagden*) (BMNH). 1 ♀, SOLOMON ISLANDS : Montgomery, Tetipari, 12.v.1934 (*H. T. Pagden*) (BMNH). 1 ♀, SOLOMON ISLANDS : Isabel [publ. as Isabbel], iii.1932 (*R. J. A. W. Lever*) (BMNH).

We have not seen the specimens (other paralectotypes from Solomon Islands) mentioned by Baranov with the data 'Renodova, 14.v.1934, leg. H. T. Pagden' and 'Calwel, i.1932' (a ♀ and ♂ respectively), and their location is unknown to us.

Goniophthalmus dubiosus Baranov, 1936*a* : 555. LECTOTYPE ♂, JAVA : Pasoeroean, 10.iii.1926 (*S. Takano*) (USNM). Genitalia *in situ*.

Paralectotype : 1 ♀, same data as lectotype (USNM).

There is a female specimen in the USNM collection labelled as new species but with the data ' Dammerman N.O. Soemba, Kambera, 4.iii.1925 '. No such specimen is mentioned in the original description and it is not a syntype.

Gymnodexia atkinsoni Baranov, 1934*a* : 49. LECTOTYPE ♂, BURMA : Maymyo, Mandalay District, 13.vi.1930, ? ex Curculionidae, on *Phyllanthus emblica* (*D. J. Atkinson*) (BMNH). Genitalia *in situ*.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♂, 1 ♀, same data as lectotype, except dates 8.vi. and 17.vi.1930 respectively (BMNH).

Although Baranov headed the original description of *atkinsoni* with a ' ♂ ' sex symbol only, we have accepted one female specimen as part of the original syntype series and have listed it above as a paralectotype. Our reasons for this are, firstly, that the specimen has identical data with the lectotype (except for slight difference in date) and bears the usual type of Baranov ' n.sp. ' label ; and, secondly, that elsewhere in the same paper Baranov has introduced a note on the ' Weibchen ' in descriptions headed ' ♂ ' only, in such a way that the descriptions *appear* to be based only on the male but were actually drawn from both sexes. We therefore infer that Baranov almost certainly had the female before him at the time of description, and accept it as an original syntype (see similar situation discussed under *Exorista quadrimaculata* Baranov).

Hapalioloemus machaeralis Baranov, 1934*f* : 162. Holotype ♂, INDIA : C.P., Rahatgaon, 7.viii.1926 (*S. N. Chatterjee*) (BMNH). Genitalia *in situ*.

Hemidegeeria villeneuvei Baranov, 1934*a* : 44. LECTOTYPE ♂, BURMA : Shwegu Res., Bhamo, 25.iii.1930, ex *Acacia pruinescens* (*D. J. Atkinson*) (BMNH). Genitalia *in situ*.

Paralectotypes : 3 ♀, same data as lectotype, except dates 29.iii., 27.iv. and 24.v.1930 (BMNH). 1 ♂, 1 ♀, same data as lectotype, except dates 1.iv. and 21.iv.1930 respectively (USNM). 1 ♀, same data as lectotype, except date 3.iv.1930 (USNM).

Illa mirabilis Baranov, 1938*a* : 172. Holotype ♀, SOLOMON ISLANDS : Guadalcanal, Lunga Estate, 4.vi.1935 (*R. J. A. W. Lever*) (BMNH).

The USNM collection contains a specimen of this species bearing the label ' Illa mirabilis g.n. sp.n. N. Baranoff ' in Baranov's writing, but it is not mentioned in the original publication and is not a type-specimen. The data are : ♀, SOLOMON ISLANDS : Savo Island, Tasimania, 500–700 ft., 24.vi.1935 (*R. J. A. W. Lever*).

Isocarceliopsis hemimacquartioides Baranov, 1934*d* : 406. LECTOTYPE ♂, FORMOSA : Toa Tsui Kutsu, v.1914 (*H. Sauter*) (DEI).

Paralectotypes : 2 ♂, FORMOSA : Takao, 8.xii.1907 (*H. Sauter*) (IZPAN, Warsaw) ; 1 ♂, same data, except date 21.xii.1907 (USNM) ; 1 ♂, same data, except date 6.xii.1907 (BMNH). In addition the following paralectotypes that are not conspecific with the lectotype (see discussion) : 2 ♂, FORMOSA : Tainan, iv.1910 (*H. Sauter*) (DEI & USNM).

It is not clear from the format in the original publication how many specimens were available to Baranov at the time of description, for he cited only the following information : ' FORMOSA : einige Exemplare im Deutschen Entomologischen Institut in Berlin-Dahlem.—Tainan, iv.1910 und Takao, xii.1907 (*H. Sauter*) ; Museum in Stettin '. Normally this punctuation would indicate in Baranov's work that he saw some specimens in the DEI collection from unspecified localities, and also specimens in Stettin from Tainan and Takao ; in fact the Stettin collection (now in Warsaw) contains specimens only from Takao, and the DEI collection contains specimens from Tainan and Toa Tsui Kutsu (a locality not actually cited by Baranov at the time of description, but recorded later by Hennig, 1941 : 198 as the locality of one of Baranov's types). In addition there are specimens from Baranov's own collection that are now in the USNM or BMNH collections, and altogether we have located seven specimens (all males) that we consider to be original syntypes and have listed above ; these include the specimen from Toa Tsui Kutsu which we consider to be one of ' einige Exemplare ', and have selected as lectotype.

It is important to note that *hemimacquartioides* type-material is mixed, and consists of two very closely similar species : in one species the male head is without proclinate orbital setae and the scutellum has small upwardly-directed crossed apical setae, and in the second species the male head has two pairs of proclinate orbital setae and the scutellum lacks apical setae. The latter species, because of the proclinate orbital setae, has the male head extremely like that of the normal female Tachinid in which these setae are present, and we think that Baranov cited ' ♀ ' as well as ' ♂ ' at the head of the description of *hemimacquartioides* in error (as we have found no female specimens among the syntypes). In the original description Baranov wrote of the scutellum that ' Die gekreuzten, aufgerichteten Apikalborsten sind fein ', and we have therefore selected the lectotype from specimens showing this character (i.e. from the species in which the male lacks the proclinate orbital setae). The specimens in which the male possesses proclinate orbital setae are both from the Tainan locality cited in the original description ; one is in the DEI collection and the other in USNM (see above).

The lectotype lacks the genitalia and the slide preparation has not been located. However, it may be noted that the conspecific male paralectotypes from Takao in the USNM and BMNH collections are both intact, and that although both males from Takao in the IZPAN collection at Warsaw are without genitalia there is a slide preparation in that collection that must associate with one of the two specimens.

Kosempomyiella rufiventris Baranov, 1934*f* : 165. LECTOTYPE ♂, FORMOSA : [no other locality data] (*H. Sauter*) (DEI). Genitalia *in situ.*

Paralectotypes : 2 ♂, same data as lectotype, but with month date ' i ' (USNM). 4 ♀, FORMOSA : Kosempo, v.1912 (*H. Sauter*) (DEI, two ; BMNH ; USNM).

Baranov's original description reads as though all syntypes (number unstated) of both sexes were from Kosempo, but the specimen bearing his red handwritten ' Typus ' label (here designated as lectotype) has no locality data other than ' Formosa I. '; only the female syntypes have the locality Kosempo on the data labels. Since there is more than one male, and none from Kosempo that we have been able to locate, Townsend's (1938 : 41) citation of ' Ht male ' does not provide a valid fixation of a lectotype.

Leiosiopsis maculibasis Baranov, 1935*a* : 553. Holotype ♂, JAPAN : Hokkaido, Sapporo (*S. Takano*) (USNM). Genitalia *in situ.*

Leverella institutiimperialis Baranov, 1934*c* : 474. Lectotype ♂, by fixation of Townsend (1939 : 43), SOLOMON ISLANDS : Guadalcanal, Doma, iii.1933 (*R. J. A. W. Lever*) (BMNH). Genitalia on slide.

Paralectotype : 1 ♀, same data as lectotype (and mounted on same pin) (BMNH).

The original material consists of one male and one female syntype, of which Townsend (1939 : 43) cited the male as ' Ht ' (= holotype) and the female as ' At ' (= allotype). Townsend's action restricts the name to a single primary type, and we accept it as providing valid fixation of a lectotype.

Leverella novaeguineae Baranov, 1934*c* : 474. Holotype ♂, INDONESIAN NEW GUINEA (WEST IRIAN) : Fakfak (USNM). Genitalia on slide.

Macrozenillia townsendi Baranov, 1935*a* : 553. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI).

Paratype : 1 ♂, JAPAN : Hokkaido, Hattaribetsu, 27.vii.1924 (*S. Takano*) (USNM).
The holotype lacks the genitalia and the slide preparation has not been located.

Masicera oculata Baranov, 1935*a* : 554. Holotype ♀, FORMOSA : Koshun, Kankau, 7.vii. 1912 (*H. Sauter*) (DEI).

Paratypes : 2 ♂, same data as lectotype, except dates vii. and 7.viii.1912 (USNM). 1 ♂, FORMOSA : Shinkwa, 3.vii.1926 (*S. Takano*) (USNM).

In the original publication there is definite reference only to specimens of *oculata* from Formosa, but Baranov added that the species was known to him from Java and South India (' Auch von Java mir bekannt aus *Baoris bada* Moore gezüchtet und aus Südindien aus *Plusia* sp. gezogen '). We have not located any specimens from these additional localities that could have been seen by Baranov, but we consider that they would in any case be without type status (as there is no evidence that they were available to Baranov at the time of description).

Meigenia mutabilis nobilis Baranov, 1926*b* : 168. LECTOTYPE ♂, JUGOSLAVIA : Serbia, Golubac, 30.iv[publ. as vi].1925 (USNM). Genitalia on slide.

The original publication shows no evidence of how many specimens Baranov saw at the time of description, but the single male of *nobilis* in Baranov's collection conforming to the original data bears a red Baranov label reading ' Typi '; we deduce from this that he had more than one original specimen, and accordingly designate the available specimen as lectotype.

Meigenia mutabilis pilosa Baranov, 1926*b* : 168. Holotype ♂, JUGOSLAVIA : Serbia, Golubac, 24.vi.1925 (USNM). Genitalia on slide.

There is no evidence that the original type-material of subspecies *pilosa* consisted of more than one specimen, and the male in the USNM collection having the data as published by Baranov is considered to be the holotype.

Meigenia mutabilis vulgaris Baranov, 1926*b* : 168. LECTOTYPE ♂, JUGOSLAVIA : Serbia, Golubac, 30.iv.1925 (USNM). Genitalia on slide.

Paralectotype : 1 ♀, same data as lectotype, except date 12.vi.1925 (USNM).

We have not located any syntype with the data ' Topčider, 9.v.1924 ' that Baranov recorded in the original publication.

Micropalpus vulpinoides Baranov, 1932*d* : 2. LECTOTYPE ♂, SUMATRA : Deli, Siriaria 2.viii.1928 (*J. C. v. d. Meer Mohr*) (MZ, Bogor). Genitalia on slide.

Paralectotype : 1 ♂, same data as lectotype (USNM).

Monoleptophaga caldwelli Baranov, 1938*b* : 412. LECTOTYPE ♂, AUSTRALIA : Queensland, Nambour [70 mi. North of Brisbane], x.1937, ex *Monolepta rosea* adult (*N. E. H. Caldwell*) (BMNH). Genitalia *in situ*.

Paralectotypes ; 2 ♀, same data as lectotype (BMNH & USNM). 4 ♂, 4 ♀, same data as lectotype (Dept. of Primary Industries Coll., Brisbane, Queensland).

Myiobia bezziana Baranov, 1938*b* : 411. LECTOTYPE ♂, INDIA : Bengal, Darjeeling, 5000 ft., 1923, (*J. C. M. Gardner*) (BMNH). Genitalia *in situ*.

Paralectotypes : 2 ♀, same data, except date 7.vii.1923 (BMNH) ; 1 ♂, same data as lectotype, except host *Zeuzera multistrigata* given (USNM) ; 1 ♀, same data, except date ii.1923 (USNM).

Baranov did not state the number or sex of his original specimens, but gave the date as 16.viii.1923. We consider all the above-listed specimens to be original syntypes, but it should be noted that none of them bears the day and month date ' 16.viii ' cited in the original publication.

Beeson & Chatterjee (1935 : 177) published this name before Baranov's description, but gave only four lines on the life history and no description ; the name is nomenclaturally unavailable from Beeson & Chatterjee (1935) under Article 13a (i) of the *International Code of Zoological Nomenclature*, 1961.

Myiofijia bezziana Baranov, 1934*c* : 478. LECTOTYPE ♂, FIJI : Taveuni, ii.1934, bred from host moth larva in coconut tree (*R. W. Paine*) (BMNH). Genitalia *in situ*.

Paralectotypes : 1 ♂, 1 ♀, same data as lectotype (USNM). 1 ♂, same data as lectotype, except date i.1934 and ' bred from host cocoon in coconut ' (USNM). 1 ♂, FIJI : Ura, Taveuni, i.1934 (*R. W. Paine*) (BMNH) ; 1 ♀, same data, except date xi.1933 (BMNH). 1 ♀, FIJI : Nabokoyia, Taveuni, iii.1934, ex pyralid cocoon on coconut tree (*R. W. Paine*) (BMNH).

Townsend (1941 : 291), for *M. bezziana*, cited ' Ht ' (= holotype) male and ' At ' (= allotype) female in London without further information ; since there are at least two male original syntypes Townsend's statement does not restrict the name to a single specimen and is not a valid lectotype fixation. A lectotype is therefore here newly designated.

Myiostoma magna Baranov, 1935*a* : 557. Holotype ♀, JAPAN : Hokkaido, Sapporo, 7.ix.1923 (*S. Takano*) (USNM).

Parexorista latistylata Baranov, 1934*d* : 405. Holotype ♂, FORMOSA : [Formosan locality unknown] i. (*H. Sauter*) (USNM). Genitalia on slide.

The holotype bears Baranov's label reading ' Carcelia latistylata n.sp. N. Baranoff TYPUS '.

Phorocera imperator Baranov, 1936 : 109. Holotype ♂, CELEBES : S. Celebes, Samanga, xi.1895 (*H. Frühstorfer*) (BMNH, ex coll. Wainwright). Genitalia *in situ*.

Phorocera isabeli Baranov, 1938*a* : 171. Holotype ♂, SOLOMON ISLANDS : Isabel, Tatamba, 11.vii [publ. as vi].1935 (*R. J. A. W. Lever*) (BMNH). Genitalia *in situ*.

Phorocera magna Baranov, 1934*a* : 46. LECTOTYPE ♂, INDONESIA : Moluccas, Batjan, viii.1929 (*W. Roepke*) (USNM : genitalia slide only).

This species was described from material obtained by W. Roepke in July and August, 1929, while investigating the parasites of *Thosea moluccana* Roepke, 1935 (Lepidoptera : Limacodidae), a serious pest of coconut in Batjan island, Moluccas. The description of *Phorocera magna* by Baranov (1935*b*) was published as an unpaginated appendix following the last page (p. 38) of Roepke's (1935) account of his work in Batjan, and was based upon four syntypes (2 ♂, 2 ♀) with the data cited by Baranov as ' Molukkeninsel Batjan, vii, 1929 (W. Roepke) '; this description, which Baranov intended to be the original description, had however already appeared in print in an earlier paper (Baranov, 1934*a*) while Roepke's work was still in press. The name *Phorocera magna* is therefore nomenclaturally available from the 1934 paper here cited.

Baranov (1934*a*), as well as repeating the description, mentioned two small specimens of *P. magna* from Ceylon, but we do not accept these specimens (which, in any case, we have been unable to locate) as original syntypes because the description was made only from the Moluccan material.

Unfortunately we have been unable to locate any of the four original syntypes, but a slide preparation of the male genitalia of one of them is in USNM (ex Baranov collection) and this we have fixed as lectotype. However, there are four specimens of *P. magna* in the Museum Zoologicum Bogoriense and four specimens in the Central Agricultural Research Institute, Bogor, which were all collected by Roepke in Batjan and reared from *Thosea moluccana* ; none of these other eight topotypic specimens existing in Bogor have been labelled by Baranov and all have the date ' xii.1929 ' (the original material was collected in July or August), and there is no evidence that any of them are syntypes. Furthermore, each of them has a locality label reading ' Penamboean, Batjan ', and it is unlikely that Baranov would have omitted the first of these words in his unusually full citation of data for *P. magna* if some of these specimens were his original material. Thus we are convinced that none of the specimens now in Bogor represent type-material. It is especially surprising that Baranov's own collection at the U.S. National Museum does not contain at least one complete syntype, as Baranov normally retained part of his type-series if this consisted of several specimens. Finally, we should record that Baranov (1934*a*) cited the month date of the original syntypes as ' VIII ', but in the later description published (Baranov, 1935*b*) he gave it as ' VII '. In the absence of syntypes we are unable to say for certain which is correct, but the lectotype genitalia slide has the August month date and we accept this as correct. The month date ' xii ' on specimens in Bogor might also possibly be in error for ' vii ' or ' viii ', but we have no evidence on this.

The specimens of *P. magna* in the Museum Zoologicum Bogoriense are three females and one male, but we do not know how many of each sex are present among the four specimens in the Central Agricultural Research Institute, Bogor.

Phorocera magna* form *maxima Baranov, 1936 : 105. LECTOTYPE ♀, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (USNM). Genitalia *in situ*.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♂ (genitalia slide only), same data as lectotype (USNM).

Phorocerosoma anomala Baranov, 1936 : 99. Lectotype ♀, by designation of Crosskey (1966 : 108), FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI).

Paralectotypes : 1 ♂, same data as lectotype, except date 22.vi.1912 (USNM). 3 ♀, same data as lectotype, except date vi.1912 (DEI). 1 ♀, same data as lectotype, except date ix.1912 (DEI). 1 ♀, same data as lectotype, except date 7.ix.1912 (DEI). 1 ♂, 2 ♀, FORMOSA: Toa Tsui Kutsu, v.1914 (*H. Sauter*) (♂ ♀ USNM, ♀ DEI).

The paralectotype series is mixed and consists of two species of *Phorocerosoma* Townsend (see Crosskey, 1966 : 108–109). The two females in the DEI collection with the data ' Toa Tsui Kutsu ' and ' Kankau ix.1912 ' are actually specimens of *Phorocerosoma vicarium* (Walker) and are not conspecific with the lectotype of *anomala* and most of the paralectotypes (which have four strong marginal setae on the third abdominal tergite and are actually specimens of *Phorocerosoma postulans* (Walker), the senior synonym of *anomala*). The lectotype and all paralectotypes of *anomala* bear the name ' Exorista anomala ' in Baranov's writing.

Baranov (1936 : 99) makes it clear that the description of *anomala* is based solely on Formosan specimens, although he cited the data (' 1 ♂, Ugi Is., 6.v.1934, leg. R. A. Lever ') of a specimen from the Solomon Islands. This specimen is in the BMNH collection and was cited by Crosskey (1966 : 108) as a syntype of *anomala* : we now consider, however, that it has no type-status.

At present the name *anomala* is in synonymy with *postulans*, but it should be noted that if again treated as valid in combination with *Phorocerosoma* the correct spelling will be *anomalum* (under Article 34(b) of the *International Code of Zoological Nomenclature*, 1961).

Plagioderophagus niger Baranov, 1938*b* : 412. LECTOTYPE ♂, INDIA : U.P., Dehra Dun, 22.iv.1930, ex larva of *Plagiodera rufescens* defol.[iating] *Flacourtia Ramnotchi* (*S. N. Chatterjee*) (BMNH). Genitalia *in situ*.

Paralectotypes : 1 ♂, 2 ♀, same data as lectotype (♂ ♀ USNM, ♀ BMNH).

Beeson & Chatterjee (1935 : 177) had already published this name, prior to Baranov's description, with a note on the life-history, but they gave no description and the name is therefore nomenclaturally unavailable from Beeson & Chatterjee (1935) under Article 13a (i) of the *International Code of Zoological Nomenclature*, 1961.

Platerycia compressa Baranov, 1936 : 111. LECTOTYPE ♂, FORMOSA : Tainan, v.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, 1 ♀, same data as lectotype (USNM). 1 ♂, FORMOSA : Koshun, Kankau, 7.vii.1912 (*H. Sauter*) (DEI). 1 ♀, FORMOSA : Hoozan, 7.ii.1911 (*H. Sauter*) (DEI).

Prosopodes leveri Baranov, 1938*b* : 410. Holotype ♀, SOLOMON ISLANDS : Russell Island, Karamola, 20.ix.1934 (*R. J. A. W. Lever*) (BMNH).

Protonemoraea japanica Baranov, 1935*a* : 556. Holotype ♂, JAPAN : Hokkaido, Sapporo, 10.ix.1923 (*S. Takano*) (USNM). Genitalia on slide.

The USNM collection also contains the female specimen noted by Baranov in the original publication as being probably conspecific with the holotype. Its data are : JAPAN : Hokkaido, Kamuikotan, 5.viii.1930 (*S. Takano*).

Protonemoraea takanoi Baranov, 1935*a* : 557. Holotype ♀, JAPAN : Hokkaido, Sapporo, 15.viii.1924 (*S. Takano*) (USNM).

Stomatomyia bezziana Baranov, 1934*a* : 48. Lectotype ♂, by designation of Crosskey (1966*a* : 673), CEYLON : Batticaloa, 13.iii.1922, ex *Nephantis serinopa* (*J. C. Hutson*) (BMNH). Genitalia on slide.

Paralectotype : 1 ♂, same data as lectotype (BMNH).

Sturmia bella oceanica Baranov, 1938*a* : 170. Holotype ♀, SOLOMON ISLANDS : San Cristobal, Waiai, 8 [publ. as S].v.1935 (*R. J. A. W. Lever*) (BMNH).

Sturmia bisetosa Baranov, 1932*b* : 75. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI).

The holotype lacks the genitalia and the slide preparation has not been located.

Sturmia chatterjeeana Baranov, 1934*c* : 484. Holotype ♂, INDIA : U.P., Dehra Dun 17.iv.1934, parasitic on *Euproctis bipunctapex* (*S. N. Chatterjee*) (BMNH). Genitalia *in situ*.

The BMNH collection contains two male specimens with same data as holotype except for date 18.vi.1934 and three female specimens with same data as holotype except for date 20.iv.1934 ; the USNM collection contains a male with same data as the holotype and a male with date 18.iv.1934 ; they bear Baranov's determination labels as *chatterjeeana* but they are not type-material.

Sturmia hutsoni Baranov, 1934*a* : 42. LECTOTYPE ♂, CEYLON : Mawanella, 7.iii.1928, larval parasite of *Earias fabia* feeding on *Hibiscus esculentus* (*J. C. Hutson*) (BMNH). Genitalia *in situ*.

Paralectotypes : 3 ♂, same data as lectotype (2 ♂ BMNH, 1 ♂ USNM).

One of the paralectotypes in BMNH lacks the abdomen.

Sturmia inconspicuella Baranov, 1932*b* : 79. Lectotype ♂, by designation of Crosskey 1967*c* : 57, 59), FORMOSA : Koshun, Kankau, viii.1912 (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotypes : 25 ♂, 6 ♀, same data as lectotype, except several dates from iv.–xi.1912 (21 ♂, 5 ♀ DEI ; 1 ♂ BMNH ; 1 ♀ USNM). 1 ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI).

There is also one male paralectotype in the collection of the Department of Agriculture, Pakistan, but the data are not known to us.

Sturmia inconspicuoides Baranov, 1932*b* : 80. Lectotype ♂, by designation of Crosskey (1967*c* : 50, 51), FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI).

Paralectotypes : 1 ♂, 3 ♀, same data as lectotype (DEI). 2 ♀, same data as lectotype, except date ix.1912 (DEI & USNM). 5 ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (2 ♂ DEI ; 2 ♂ USNM ; 1 ♂ BMNH).

The lectotype lacks the genitalia and the slide preparation has not been located. Two of the paralectotypes (♀) in DEI collection with the same data as the lectotype and the female in DEI with data ' Kankau ix.1912 ' are believed to be misidentified and not conspecific with the lectotype (see Crosskey, 1967*c* : 51) ; it is probable also that the female specimen in USNM with the same data ' Kankau ix.1912 ' is likewise not conspecific with the lectotype.

Sturmia latiforceps Baranov, 1932*b* : 78. Lectotype ♂, by designation of Crosskey (1967*c* : 72–73), FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotypes : 6 ♂, same data as lectotype (4 ♂ DEI ; 1 ♂ USNM ; 1 ♂ coll. Mesnil, Delémont). 1 ♂, same data as lectotype, except date ix.1912 (BMNH). 2 ♂, same data as lectotype, except date iv.1912 (DEI & USNM). 1 ♂, same data as lectotype, except date v.1912 (DEI). 2 ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI).

In the original publication Baranov mentioned thirteen males from Kankau and Sokutsu ; all have been located and are accounted for above.

Sturmia latistylata Baranov, 1932*b* : 79. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.ix.1912 (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotypes : 3 ♂, 1 ♀, same data as lectotype, except no day date (DEI). 2 ♂, 1 ♀, same data as lectotype, except date 7.viii.1912 (♂ DEI, ♂ ♀ USNM). 1 ♂, same data as lectotype, except date vii.1912 (USNM). 4 ♂, FORMOSA : Kanshizei, v.1908 (*H. Sauter*) (2 ♂ DEI, 2 ♂ BMNH). 1 ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI.).

In the original publication Baranov mentioned fourteen specimens (11 ♂, 3 ♀) ; we have located this total, but 12 ♂ and 2 ♀. One of the males in USNM collection has a pair of proclinate orbital setae and may have been mistaken for a female, thus accounting for the discrepancy. The female paralectotype from Kankau in DEI collection, and one of the males from Kanshizei in the same collection, have lost the abdomen. The male paralectotype from Sokutsu is mis-associated with the lectotype, and is a specimen of *Zygobothria atropivora* (Robineau-Desvoidy); the male paralectotype in DEI with date 7.viii.1912 from Kankau is also mis-associated and is a specimen of a *Sisyropa* species.

Sturmia macrophallus Baranov, 1932*b* : 76. Lectotype ♂, by designation of Crosskey (1967*b* : 105), FORMOSA : Koshun, Kankau, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♂, same data as lectotype (USNM). 1 ♀ FORMOSA : Tainan, v.1912 (*H. Sauter*) (DEI.)

All specimens mentioned by Baranov in the original publication have been located and are listed above. In addition the Baranov collection in USNM has another male with data identical to those of the lectotype, but it is not mentioned as part of the original syntype series and is not therefore a paralectotype.

Sturmia nigribarbis Baranov, 1934*a* : 42. LECTOTYPE ♂, BURMA : Upper Thaungyin, Moulmein, 17.viii.1931, parasitic on *Hapalia machaeralis* pupa (*D. J. Atkinson*) (BMNH). Genitalia ***in situ***.

Paralectotypes : 2 ♂, 2 ♀, same data as lectotype (♂♂ USNM, ♀♀ BMNH). 3 ♀, same data as lectotype, except date 14.viii.1931 (1 in BMNH, 2 in USNM).

Sturmia oculata Baranov, 1932*b* : 80. Holotype ♂, FORMOSA : Tainan, v.1912 (*H. Sauter*) (location not traced, possibly lost).

The holotype of *oculata* should be in the DEI collection, and was recorded as present in that collection by Hennig (1941 : 199). It is now missing from DEI collection and has not been located.

Sturmia painei Baranov, 1934*a* : 42. Lectotype ♂, by designation of Crosskey (1967*c* : 81–82), JAVA : [Javanese locality unknown] 1929–30, ex *Tirathaba* sp. (*R. W. Paine*) (BMNH). Genitalia ***in situ***.

Paralectotypes : 2 ♂, 3 ♀, same data as lectotype (1 ♂, 2 ♀ BMNH ; 1 ♂, 1 ♀ USNM). 1 ♂ (genitalia slide only), same data as lectotype (USNM).

Sturmia paradoxalis Baranov, 1932*b* : 80. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Mesnil's (1951 : 200) citation of the month date of the holotype as ' November ' is in error.

Sturmia picta Baranov, 1932*b* : 77. LECTOTYPE ♂, FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI). Genitalia ***in situ***.

Paralectotypes : 2 ♂, same data as lectotype (DEI & USNM). 1 ♂, 1 ♀, same data as lectotype, except no day date (♂ DEI, ♀ USNM). 3 ♂, 1 ♀, same data as lectotype, except date vi.1912 (2 ♂ DEI ; 1 ♂, 1 ♀ USNM). 1 ♂, same data as lectotype, except date ix.1912 (BMNH).

Hennig (1941 : 199) recorded 16 ' Typen ' in DEI collection, but some of these have not been traced.

Sturmia sumatrana Baranov, 1932*d* : 1. Holotype ♀, SUMATRA : N.O. Sumatra, Medan, iv.1928 (*J. C. v. d. Meer Mohr*) (USNM).

Sturmia trisetosa Baranov, 1932*b* : 78. Lectotype ♂, by designation of Crosskey (1967*b* : 105), FORMOSA : Koshun, Kankau, vii.1912 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotypes : 1 ♀, same data as lectotype (USNM). 1 ♂, 2 ♀, same data as lectotype, except date 7.viii.1912 (♂ BMNH, 2 ♀ DEI). 1 ♂, same data as lectotype, except date viii.1912 (USNM). 1 ♂, 3 ♀, same data as lectotype, except date ix.1912 (1 ♂, 2 ♀ DEI, 1 ♀ BMNH). 1 ♂, FORMOSA : Sokutsu, vi.1912 (*H. Sauter*) (DEI). 1 ♂, FORMOSA : Taihorinsho, ix.1912 (*H. Sauter*) (DEI).

The paralectotype from Taihorinsho (DEI) and the male paralectotype from Kankau ix.1912 in DEI collection have lost the abdomen.

Sturmia trisetosoides Baranov, 1932*b* : 78. Lectotype ♂, by designation of Crosskey (1967*b* : 105), FORMOSA : Tainan, iv.1910 (*H. Sauter*) (DEI). Genitalia on slide.

Paralectotype : 1 ♂, same data as lectotype (USNM).

Baranov based the original description on two males and a female, all from Tainan. The female syntype has not been located. The Baranov collection in USNM contains four males that have the same data as the lectotype and are all labelled by Baranov as ' n.sp. N. Baranoff ' in his usual style of label. Not all of these can be regarded as syntypes, since the original description mentions only two males (i.e. one in addition to the lectotype) ; one of them, however, has had the hypopygium extracted and it is considered that this one is the second specimen of the original pair (it is therefore listed as male paralectotype above, and has been labelled as such).

Sturmia unguicularis Baranov, 1934*c* : 480. Holotype ♂, JAVA : Ngantang (*Frau Neuhaus*) (USNM).

The holotype lacks the genitalia and the slide preparation has not been located. In the original description Baranov mentioned a second specimen from New Caledonia which he expressly excluded from the type-material by the following statement : ' Vorliegende Beschreibung bezieht sich auf das javanische Exemplar und das neukaledonische Exemplar, welches in ziemlich schlechten Zustande ist, betrachte ich nur als Idiotype und nicht als Cotype '. This specimen, in poor condition as Baranov said, is in the BMNH collection and has the following data : ♂, NEW CALEDONIA : Noumea, 17.v.1928 (*T. D. A. Cockerell*).

Sturmia unisetosa Baranov, 1932*b* : 75. Lectotype ♂, by designation of Crosskey (1967*c* : 68–69), FORMOSA : Koshun, Kankau, 7.viii.1912 (*H. Sauter*) (DEI).

Paralectotypes : 1 ♂, same data as lectotype, except date 7.ix.1912 (DEI). 1 ♂, same data as lectotype, except date ix.1912 (USNM).

The lectotype lacks the genitalia and the slide preparation has not been located.

Sturmia vicinella Baranov, 1932*b* : 79. Holotype ♂, FORMOSA : Tainan, iv.1910 (*H. Sauter*) (DEI).

The holotype lacks the genitalia and the slide preparation has not been located.

Sturmia wainwrighti Baranov, 1932*f* : 100. Holotype ♂, INDIA : Assam, Khasia Hills, 21.iii.1911 (*C. B. Antram*) (BMNH, ex coll. Wainwright). Genitalia *in situ*.

Paratypes : 7 ♂, 8 ♀, same data as holotype (BMNH). 1 ♂, same data as holotype (USNM). 3 ♂, 2 ♀, same data as holotype, except date 20.iii.1911 (BMNH). 1 ♀, same data as holotype, except date 20.iii.1911 (USNM). 1 ♀, same data as holotype, except date 23.iii.1911 (BMNH). 1 ♂, same data as holotype, except date 11.iii.1910 (BMNH).

Not all of the dates of the paratype material were recorded by Baranov in the original publication, but we are nevertheless satisfied that all the specimens (other than the holotype) listed above are acceptable as paratypes.

Sumatrodexia incisuralis Baranov, 1932*e* : 215. Holotype ♂, CHINA : Szechwan, Tatsienlu (*Exp. Stötzder*) (Staatliches Museum für Tierkunde, Dresden). Genitalia on slide.

Sumatrodexia montana Baranov, 1932*e* : 215. LECTOTYPE ♂, JAVA : Tjibodas, 1400 m, xii.1927 (USNM). Genitalia *in situ*.

Paralectotypes : 3 ♂, same data as lectotype (2 in MZ, Bogor & one in BMNH).

Both paralectotypes in the Bogor collection lack the genitalia, but an associated slide preparation from one of them is present in the same collection.

Sumatrodexia vittata Baranov, 1932*e* : 215. Holotype ♂, JAVA : Surabaja (USNM). Genitalia *in situ*.

Takanoella parvicornis Baranov, 1935*a* : 559. Holotype ♂, JAPAN : Hokkaido, Sapporo, 28.iv.1924 (*S. Takano*) (USNM). Genitalia *in situ*.

Tamanukia japanica Baranov, 1935*a* : 551. Holotype ♂, JAPAN : Hokkaido, Obihiro, 30.viii.1924 (*S. Tamanuki*) (USNM). Genitalia on card mount below locality label.

Trichoformosomyia sauteri Baranov, 1934*j* : 164. LECTOTYPE ♂, FORMOSA : Formosa I. (*H. Sauter*) (DEI). Genitalia *in situ*.

Paralectotypes : 1 ♂, FORMOSA : Sokutsu, vi.1912 (BMNH). 1 ♂, FORMOSA : Suisharya, x.1911 (USNM).

Baranov did not state the number of male specimens on which the description was based, but Townsend (1939 : 145) assumed that the specimen in DEI collection was the ' Ht ' (= holotype). We do not accept this as a valid lectotype fixation because there are other male syntypes with Baranov's ' n.g., n.sp. ' labels in other collections, and we therefore here fix the lectotype of *T. sauteri* by present designation.

Tricholyga psychidarum Baranov, 1934*a* : 47. Holotype ♂, SUMATRA : Pematang Siantar, Naga Hoeta Estate, 1750 ft., 10.x.1931, ex larva of bagworm (*R. I. Nel*) (BMNH). Genitalia on slide.

Paratypes : 2 ♂, same data as holotype (USNM). 1 ♂, same data as holotype, except date given as 6–10.x.1931 (BMNH). 1 ♀, same data as holotype, except date 14.x.1931 (USNM). 1 ♀, SUMATRA : Pematang Siantar, Simpang Raja Estate, 2200 ft., 17.i.1932 (*R. I. Nel*) (BMNH) ; 1 ♀, Pematang Siantar, Bah Kapoel Estate, 1500 ft., 2.i.1932, ex larva of bagworm (USNM). 1 ♀, SUMATRA : Pematang Siantar, Mardjandi Estate, 2500 ft., 24.i.1932, ex larva of bagworm (*R. I. Nel*) (BMNH).

In the original description Baranov characterized *psychidarum* as having hairy eyes, but mentioned that most specimens of the type-material had the hairing rubbed off (' bei den meisten Exemplaren Behaarung abgerieben '). From our own examination of the holotype and paratype material we are sure that two separate species are involved, one having the eyes virtually bare in the natural state and the other having the eyes conspicuously long haired, for the eye difference is associated with quite different forms of male genitalia ; other material of the complex now available also confirms this conclusion. The holotype has bare eyes, and the name *psychidarum* therefore applies to the species with this character. Most of the above-listed paratypes have bare eyes and are conspecific with the holotype, but two of the female paratypes are hairy-eyed and mis-associated : these are the USNM specimen with date 2.i.1932 and the BMNH specimen from Mardjandi Estate, 24.i.1932. No applicable name is known to us for the hairy-eyed species, which appears at present to be undescribed. The BMNH collection contains a hairy-eyed male with data ' Sumatra, Naga Hoeta Est., P. Siantar, 8.xii.30 R. I. Nel ' but it bears a determination label in Baranov's writing as ' Eutachina psychidarum Baranoff ' and is evidently not an original paratype. The same collection also has a hairy-eyed female with data ' Malaya, Chebiot Estate, Labu, 28.9.1928 ', but is also labelled by Baranov as ' Eutachina psychidarum Bar. ' and is presumed not to be the paratype mentioned in the original publication from ' Malaya, 28.ix.1928 ', which has not been seen.

Vibrissina hokkaidensis Baranov, 1935*a* : 554. LECTOTYPE ♂, JAPAN : Hokkaido, Sapporo, 19 [publ. as 12].x.1923 (*S. Takano*) (USNM). Genitalia *in situ*.

Paralectotype : 1 ♀, same data as lectotype (USNM).

Voria edentata Baranov, 1932*a* : 83. Holotype ♂, FORMOSA : Koshun, Kankau, 22.vi.1912 (*H. Sauter*) (not located and possibly lost : formerly in DEI).

Baranov described this species only from the single specimen recorded above and cited the DEI collection as the type depository. The holotype was later seen and recorded by Hennig (1941 : 192), who also cited the locality and date as ' Kankau, VI ' for the type and mentioned three other specimens in the DEI collection (another specimen from Kankau and two just with the data ' Formosa '). We have been unable during the preparation of the present work to locate the holotype specimen and consider that it is possibly lost ; furthermore, the DEI collection now contains only two of the three other specimens recorded by Hennig (viz. a male with data ' Kankau 7.vii.1912 H. Sauter ' and female with data ' Formosa I Sauter ', both determined by Baranov as *Voria edentata*).

In a revision of Old World Voriini the data of the ' type ' of *edentata* has been cited by d'Aguilar (1957 : 262) as ' l'ile de Taiwan : Kankau, récolté en juillet-août 1912, par H. Sauter ', but Baranov clearly cited the holotype date as ' 22.vi.1912 ' in the original publication and Hennig also found the month date to be June. Thus probably d'Aguilar did not see the true holotype from DEI, but may have seen the later determined specimen from Kankau in DEI collection (recorded above), although this specimen bears no month date August. Dr. d'Aguilar (personal communication) has kindly confirmed that the specimen seen by him was returned to DEI, and Dr. L. P. Mesnil has confirmed that the holotype is not on loan to him at Delémont.

It should be noted that the slide preparation of the male genitalia from the specimen of *V. edentata* with the date ' Kankau 7.vii.1912 ' is also in the DEI collection, but not the slide preparation from the holotype.

Winthemia diversa solomonica Baranov, 1938*b* : 405. Holotype ♂, SOLOMON ISLANDS : Tulagi, 4.ix.1934, ex psychid cocoon (*R. J. A. W. Lever*) (BMNH). Genitalia *in situ*.

Winthemia diversoides Baranov, 1932*c* : 47. Holotype ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (DEI). Genitalia on slide.

At the time of writing the holotype is temporarily in the collection of Dr. L. P. Mesnil, at Delémont, Switzerland.

Winthemia hokkaidensis Baranov, 1939 : 110. Holotype ♀, JAPAN : Hokkaido, Sapporo, 10.ix.1923 [publ. as 1929] (*S. Takano*) (USNM).

Winthemia mallochi Baranov, 1932*c* : 46. Holotype ♂, FORMOSA : Koshun, Kankau, vi.1912 (*H. Sauter*) (DEI). Genitalia on slide.

At the time of writing the holotype is temporarily in the collection of Dr. L. P. Mesnil, at Delémont, Switzerland.

Zenillia caldwelli Baranov, 1938*b* : 409. Holotype ♀, AUSTRALIAN NEW GUINEA : Admiralty Islands, Manus, 1932 (*N. E. H. Caldwell*) (BMNH).

Zenillia roseanella Baranov, 1936 : 104. LECTOTYPE ♂, FORMOSA : Sokutsu, ix.1912 (*H. Sauter*) (USNM). Genitalia on slide.

Paralectotypes : none traced.

In the original publication Baranov recorded a specimen from New Britain that is now in the BMNH collection and has the following data : ♂ (without abdomen) NEW BRITAIN : Rabaul, 29.i.1934, ex lepidopterous larva (*J. L. Froggatt*). This specimen, however, has only a Baranov determination label as ' Zenillia roseanella Baranoff ', and it is not a syntype because Baranov expressly stated that the description was based on ' Exemplare ' from Formosa which he was publishing in the 1936 paper (' hier an dieser Stelle ') as it had not yet appeared elsewhere. Thus the name is based on syntypes from Formosa, of which only one (here fixed as lectotype) has been located.

PART II.—BARANOV'S MANUSCRIPT NAMES THAT HAVE BEEN PUBLISHED.

We bring together in the following alphabetical list all those manuscript names of Baranov that have appeared in print, either as *nomina nuda* or as species-group names made available by the action of later authors. The available species-group names are shown in bold type.

Actia mallochiana Gardner, 1940 : 178 (*Actia mallochiana* Baranov MS). Available name, attributable to Gardner.

Gardner described the puparium of a species of Tachinid fly under Baranov's hitherto unpublished manuscript name *Actia mallochiana*. Under Article 10 of the *International Code of Zoological Nomenclature*, 1961, the name *mallochiana* is made available by, and must be attributed to, Gardner.

Allophora dubiosa Baranov *in* Hennig, 1941 : 187. *Nomen nudum.*

Hennig listed without description (as '*Phasia dubiosa* Baranoff') a specimen in DEI collection from Formosa that bears a Baranov label as 'Allophora dubiosa n.sp. N. Baranoff'; the name was not published by Baranov and remains a *nomen nudum*.

Argyrophylax rufitibialis Baranov *in* Hennig, 1941 : 196. *Nomen nudum.*

Hennig listed, under this name and without description, a specimen from Hoozan in Formosa in DEI collection ; the name was not published by Baranov and remains a *nomen nudum*. Mesnil (1944 : 27) also cited the name, but did not validate it by description.

Bactromyia compsiluroides Baranov *in* Baranov, 1938*b* : 409. *Nomen nudum.*

Baranov mentions *compsiluroides* as a Formosan species in his original description of *Bactromyia crassiseta* Baranov, 1938, but without characterizing it, and the name remains a *nomen nudum*.

Cossidophaga kalshoveni Baranov *in* Baranov, 1934*f* : 161. Manuscript name cited in synonymy, unavailable.

This name was cited by Baranov in synonymy under *Cossidophaga atkinsoni* (Aubertin), a species described by Aubertin (1932) as *Podomyia atkinsoni*. Baranov (1934*f* : 161), when describing the new genus *Cossidophaga* for *atkinsoni*, abandoned his intended specific name *kalshoveni* for this species but published the latter name in synonymy ; it is unavailable under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961.

Crocuta taiwanica Baranov *in* Hennig, 1941 : 195. *Nomen nudum.*

Hennig listed without description (as '*Siphona taiwanica* Baranoff') four specimens in the DEI collection from Macuyama and Toa Tsui Kutsu in Formosa ; the name was not published by Baranov and remains a *nomen nudum*.

Ctenophorocera sturmioides Mesnil, 1950 : 126 (*Prosopaea sturmioides* Baranov MS). Available name, attributable to Mesnil.

Mesnil (1950 : 126) described *Ctenophorocera sturmioides* as a new species based upon a male holotype specimen (in DEI collection) labelled by Baranov as 'Prosopaea sturmioides n.sp. N. Baranoff' and with the data :—Formosa : Sokutsu, vi.1912 (*H. Sauter*). Mesnil placed the species in his subgenus *Parapales* Mesnil, and the holotype is labelled (in addition to Baranov's label) as 'Parapales sturmioides Mesn.' in Mesnil's writing.

Hennig (1941 : 196) listed the name *Prosopaea sturmioides* Baranoff but gave no description ; he mentioned three specimens in DEI collection from Formosa, one without further data, one from Toa Tsui Kutsu, and one from Sokutsu, of which only the last was seen by Mesnil (i.e. the holotype cited above). It should be noted that the month date of the holotype specimen from Sokutsu is 'vi' as given by Hennig, and not 'v' as given by Mesnil (1950 : 127).

Cuphocera varia form *formosana* Baranov *in* Baranov, 1936 : 98. Manuscript name cited in synonymy, unavailable.

This name was cited by Baranov in synonymy under the true *Cuphocera varia* (Fabricius), and is unavailable under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961.

Cuphocera varia form *malayana* Baranov *in* Baranov, 1936 : 98. Manuscript name cited in synonymy, unavailable.

This name was cited by Baranov in synonymy under the true *Cuphocera varia* (Fabricius), and is unavailable under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961.

Dolicholon ater Gardner, 1940 : 177 (*Dolichocolon ater* Baranov MS). Available name, attributable to Gardner.

Gardner described and figured the puparium of a species of Tachinid fly under Baranov's hitherto unpublished manuscript name *Dolichocolon ater*. Under Article 10 of the *International Code of Zoological Nomenclature*, 1961, the name *ater* is made available by, and must be attributed to, Gardner.

Euhapalivora **indica** Gardner, 1940 : 179 (*Euhapalivora indica* Baranov MS). Available specific name, attributable to Gardner.

Gardner described and figured the puparium of a species of Tachinid fly under Baranov's hitherto unpublished manuscript name *Euhapalivora indica*. The specific name *indica*, even though published in combination with an unavailable genus-group name, is available under Article 11 (g) (ii) of the *International Code of Zoological Nomenclature*, 1961, and is attributable to Gardner under Article 10. The generic name *Euhapalivora* (as mentioned by Crosskey, 1967*a*: 13) is not accompanied, however, by a definition of the generic taxon and is a *nomen nudum* which is unavailable under Article 13 (a).

The species *indica* has been assigned to the genus *Pseudoperichaeta* Brauer & Bergenstamm by Crosskey (1967*b*).

Exorista apicalis Baranov *in* Hennig, 1941 : 193. *Nomen nudum.*

Hennig listed without description 20 specimens in DEI collection from Kankau and Sokutsu in Formosa ; the name was not published by Baranov and remains a *nomen nudum*. Mesnil (1950 : 153) cited *Exorista apicalis* Baranov as a synonym of *Sisyropa soror* Mesnil, 1944, but it is nevertheless unavailable from Mesnil under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961.

Exorista grisellina Gardner, 1940 : 177 (*Exorista grisellina* Baranov MS). Available name, attributable to Gardner.

Gardner described and figured the puparium of a species of Tachinid fly under Baranov's hitherto unpublished manuscript name *Exorista grisellina*. Under Article 10 of the *International Code of Zoological Nomenclature*, 1961, the name *grisellina* is made available by, and must be attributed to, Gardner.

Exorista maculiventris Baranov *in* Hennig, 1941 : 194. *Nomen nudum.*

Hennig listed, under this name and without description, two specimens in DEI collection from Kankau in Formosa ; the name was not published by Baranov and remains a *nomen nudum*. Mesnil (1950 : 154) cited *Exorista maculiventris* Baranov as a synonym of *Sisyropa thermophila* (Wiedemann, 1830), but it is nevertheless unavailable from Mesnil under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961.

Exorista pulchra Baranov. See **Zenilliana pulchra** Mesnil.

Exorista simulator Baranov *in* Hennig, 1941 : 194. *Nomen nudum.*

Hennig listed, under this name and without description, three specimens in DEI collection from Formosa, two without further data and the other one from Toa Tsui Kutsu ; the name was not published by Baranov and remains a *nomen nudum*. Mesnil (1949 : 66) cited the name '*simulator* Bar. (in litt.)' as a synonym of *Phorocerosoma forte* Townsend without noting the generic name used by Baranov ; it is nevertheless unavailable under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961.

Exorista winthemioides Baranov. See **Nemosturmia winthemioides** Mesnil.

Gymnodexia orientalis Baranov *in* Baranov, 1934*a* : 49. *Nomen nudum.*

Baranov (1934*a* : 49), in the original description of *Gymnodexia atkinsoni*, made the statement : 'Am nächsten zu *orientalis* mihi (in litteris)', but nowhere published a description of *orientalis*. Hennig (1941 : 191), under the name *Gymnodexia orientalis* Baranoff but without description, listed three specimens in the DEI collection from Formosa. The name remains a *nomen nudum*.

Hyalomyodes orientalis Baranov *in* Hennig, 1941 : 189. *Nomen nudum.*

Hennig listed, under this name and without description, a specimen in DEI collection from Tainan in Formosa ; the name was not published by Baranov and remains a *nomen nudum.*

Kosempomyia sauteri Baranov *in* Baranov, 1934*j* : 165. Manuscript name cited in synonymy, unavailable.

This name was cited by Baranov in synonymy with *Kosempomyiella rufiventris* Baranov, and is unavailable under Article 11 (d) of the *International Code of Zoological Nomenclature*, 1961. Hennig (1941 : 187) listed the name without description, and mentioned three specimens in DEI collection, two from Formosa without other data and one from Kosempo in Formosa.

Leskia deaurata Baranov *in* Hennig, 1941 : 190. *Nomen nudum.*

Hennig listed, under this name and without description, a specimen in DEI collection from Sokutsu in Formosa ; the name was not published by Baranov and remains a *nomen nudum.*

Masicerella **indistincta** Gardner, 1940 : 178 (*Masicerella indistincta* Baranov MS). Available specific name, attributable to Gardner.

Gardner described and figured the puparium of a species of Tachinid fly under Baranov's hitherto unpublished manuscript name *Masicerella indistincta.* The specific name *indistincta,* even though published in combination with an unavailable genus-group name, is available under Article 11 (g) (ii) of the *International Code of Zoological Nomenclature*, 1961, and is attributable to Gardner under Article 10. The generic name *Masicerella* (as mentioned by Crosskey, 1967*a* : 18) is not accompanied, however, by a definition of the generic taxon and is a *nomen nudum* which is unavailable under Article 13 (a).

Medinodexia formosana Baranov *in* Hennig, 1941 : 190. *Nomen nudum.*

Hennig listed, under this name and without description, a specimen in DEI collection from Tainan in Formosa ; the name was not published by Baranov and remains a *nomen nudum.*

Meigenia setosa Baranov *in* Hennig, 1941 : 193. *Nomen nudum.*

Hennig listed, under this name and without description, a specimen in DEI collection from Hoozan in Formosa ; the name was not published by Baranov and remains a *nomen nudum.*

Nemosturmia winthemioides Mesnil, 1949 : 76 (*Exorista winthemioides* Baranov MS). Available name, attributable to Mesnil.

Mesnil (1949 : 76) described *Nemosturmia winthemioides* as a new species based upon a male holotype specimen from Formosa in the DEI collection labelled by Baranov as ' Exorista Winthemioides '; Mesnil erroneously attributed authorship of the name *winthemioides* to Baranov, but Baranov did not publish the name, and authorship of the name *winthemioides* is attributable to Mesnil.

Hennig (1941 : 194) listed the name '*Exorista winthemioides* Baranoff ' and mentioned the single specimen in DEI collection (now the holotype of *Nemosturmia winthemioides* Mesnil), but he gave no description.

Paradionaea orientalis Baranov *in* Hennig, 1941 : 189. *Nomen nudum.*

Hennig listed, under this name and without description, a specimen in DEI collection from Kankau in Formosa ; the name was not published by Baranov and remains a *nomen nudum.*

Phasia dubiosa Baranov. See *Allophora dubiosa* Baranov.

Phorinia flavipalpis Baranov *in* Hennig, 1941 : 194. *Nomen nudum.*

Hennig listed, under this name and without description, five specimens in DEI collection from Kankau in Formosa ; the name was not published by Baranov and remains a *nomen nudum.*

Phoriniophylax femorata Mesnil, 1957 : 14 (*Phoriniophylax femorata* Baranov MS). Available name, attributable to Mesnil.

Hennig (1941 : 196) listed, under this name but without description, two specimens in DEI collection from Tainan in Formosa that are determined by Baranov as ' Phoriniophylax femorata ', but Baranov never published this name. Later Mesnil (1944 : 27) placed the name *femorata* Baranov in combination with *Argyrophylax* Brauer & Bergenstamm, but without validating it by description so that it remained at that time (1944) a *nomen nudum*. In a more recent work, however, Mesnil (1957 : 14) appended to the description of his new subspecies *Argyrophylax nova novella* Mesnil the following remark : ' il est probable que *Phoriniophylax femorata* Baranov est congénérique de cette espèce [*Argyrophylax nova* Mesnil]. Elle s'en distingue par ses pattes jaunes à tarses noirs '. We consider that this statement purports to give characters differentiating the taxon *femorata*, and that the name is nomenclaturally available under Article 13 (a) (i) of the *International Code of Zoological Nomenclature*, 1961 ; under Article 10 it takes the authorship and date of Mesnil, 1957.

Prosopaea sturmioides Baranov. See ***Ctenophorocera sturmioides*** Mesnil.

Siphona taiwanica Baranov. See *Crocuta taiwanica* Baranov.

Sumpigaster formosensis Baranov *in* Hennig, 1941 : 190. *Nomen nudum.*

Hennig listed, under this name but without description, three specimens in DEI collection from Formosa (no other data) ; the name was not published by Baranov and remains a *nomen nudum.*

Zenilliana pulchra Mesnil, 1949 : 68 (*Exorista pulchra* Baranov MS.) Available name, attributable to Mesnil.

Mesnil (1949 : 68) described *Zenilliana pulchra* as a new species based upon a male holotype specimen from Sokutsu, Formosa, in the DEI collection, but erroneously attributed authorship of the name to Baranov ; however, Baranov did not publish it, and authorship of the name *pulchra* is attributable to Mesnil.

Hennig (1941 : 194) listed the name ' Exorista pulchra Baranoff ' and mentioned the single specimen in DEI collection (now the holotype of *Zenilliana pulchra* Mesnil), but he gave no description ; hence *Exorista pulchra* Baranov *in* Hennig is a *nomen nudum.*

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BRITISH MUSEUM
- 3 DEC 1969
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THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 3
LONDON : 1969

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BY

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Pp. 65–82; 8 *Text-figures*

BULLETIN OF
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LONDON : 1969

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This paper is Vol. 24, *No.* 3 *of the Entomology series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

World List abbreviation :
Bull. Br. Mus. nat. Hist. (Ent.)

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 3 *December,* 1969

Price Eleven Shillings
(£0·55)

BOMBYLIIDAE, AND A FIRST RECORD OF NEMESTRINIDAE FROM SOKOTRA (DIPTERA)

D. J. GREATHEAD

SYNOPSIS

The Bombyliidae of Sokotra are reviewed and new species described as the result of the examination of a new collection of specimens from the island made by K. M. Guichard in 1967. The first record of a Nemestrinid, *Atriadops cinnamonea* Brunetti, is also reported.

THE first collections of Diptera from Sokotra were made by W. R. O. Grant, published by Ricardo (1903), and by O. Simony, published by Becker (1910), both in the same year, 1899. No subsequent collections of Diptera were made until 1967 when a collecting expedition to Southern Arabia and Sokotra was made by K. M. Guichard. New material of all the described species from the island has thus become available as well as material of other species both new and not previously known from the island. This new material was collected between March and May, whereas previous visitors who collected Bombyliidae were there in December to February. This difference in timing has not, as far as can be inferred from the Bombyliidae, made a marked difference in the species in flight.

All three collectors travelled in the relatively flat northern part of the island. No specimens of Bombyliidae are available from the higher parts of the Haggier mountains or the southern coastal area. Popov (1957) has provided a description of the vegetation, which can be classified as subdesert and, like the fauna, includes a high proportion of endemics.

The Bombyliidae now known from the island comprise 16 or 17 species, of which 9 are not known from outside Sokotra and Abd-el-Kuri. The remainder are all recorded from the arid adjoining areas of the African mainland and four from Southern Arabia. Of the endemic species only one, *Bombylius socotrae,* is not clearly allied to species known from neighbouring parts of Africa and Arabia. As, however, very little is known of the Bombyliidae of the Somali Peninsula any detailed comparison is premature. Examination of the material leaves a general impression of a tendency to greater size and more striking colouring than mainland counterparts, thus *Petrorossia sokotrae* is on average much larger than any African species and the specimens of *Hemipenthes inauratus* and *Anthrax fuscipennis* are all at the upper limit of size found on the mainland. *Villa dioscoridae* and *Exoprosopa punctipennis* both show the latter tendency to a striking extent.

The record of a Nemestrinid from the island is of interest both because it adds a new family to the faunal list and because it is apparently the same as a species described from Malawi. However, the extent of the distributions of Nemestrinidae cannot be assessed as they are seldom captured.

Family **BOMBYLIIDAE**

Bombylius mollis Bezzi

Bombylius mollis Bezzi, 1921 : 15.

The specimen listed as *Bombylius* sp. by Ricardo (1903) has been examined ; although the proboscis is missing and the dorsal surface largely denuded, there is no doubt as to its identity. *B. mollis* is a widespread species ranging from Ethiopia to Transvaal.

SOKOTRA : Adho Dimellus, 3500 ft, 1 ♂, 9.ii.1899 (*W. R. O. Grant*), BM(NH).

***Bombylius socotrae* sp. n.**

A single female *Bombylius*, the only other specimen of the genus from Sokotra, represents a remarkable new species with a combination of characters not fitting into any of the groupings erected by Bezzi (1924). It is nearest to the *B. minor* group in its pale whitish pubescence, pale legs with black spines, hyaline wings and black body. These characters, as well as the brown antennae, black proboscis and complete absence of black hairs or bristles except on the legs distinguish it from other species.

Head : black with heavy grey tomentum except for the buccal margin which is yellowish grey. Eyes separated by almost three times the width of the ocellar tubercle at the vertex, which is tumid and separated by a groove from the frons. All hair and scales white, shaggy on frons and face, shorter elsewhere and with a broad band of scales surrounding the eyes. Antennae with third segments missing, first and second reddish brown to greyish, first three times the length of second, hairs on first white, second bare except for minute yellowish spicules. Proboscis black, with a reddish base twice the length of the head, palpi reddish brown with colourless spicules. *Thorax* : black, heavily dusted with grey-brown tomentum on the dorsal surface and grey elsewhere, densely covered in greyish white hair, macrochaetae glistening white. *Legs* : coxae black, remainder brown, lighter on the femora and tibiae, darker on the tarsi which are blackish at their tips. Hair on femora and scales white, spines and spicules well developed, black. Fore and mid femora unarmed, hind with a row of six anteroventral spines as well as apical spines above and a single anterodorsal and a single posterodorsal one near the apex. Claws mostly missing, posterior ones black with a reddish base, pulvilli white, almost as long as the claws. *Wings* : hyaline but tinged opaque yellowish at the base in costal cell and in first basal cell. Veins reddish brown at fore border, paler towards the posterior margin where they are yellowish brown. Venation ; middle crossvein almost at middle of discoidal cell, first posterior cell blunt at apex and stalk long, longer than penultimate section of vein. Squamae and alulae white with white fringes. Halteres brownish tinged. *Abdomen* : black with a brownish grey tomentum, tergites reddish at their sides and yellowish on the posterior margins, more broadly at the apex than base. Hairs and bristles white, the latter inconspicuous, weak, hairlike. Ovipositor concealed in a dense tuft of yellow hair.

Length of body 9 mm ; of wing 8 mm ; of proboscis 4 mm.

Holotype ♀. SOKOTRA : Kalinsiya, sea-level, 26.iii.1967 (*K. M. Guichard*), BM(NH).

Systoechus somali Oldroyd

Systoechus somali Oldroyd, 1947 : 105.

This species, which is well known as a predator of the desert locust, *Schistocerca gregaria* Forskål, is common in Somalia, the Ogaden in Ethiopia and northern Kenya (Hynes, 1947 ; Greathead, 1958). Only a single specimen was collected in Sokotra, but it shows no differences from mainland specimens.

The species belongs to the group with hyaline wings, entirely pale bristles on the legs and no abdominal bristles in the male. The male is distinguished from other species by the entirely blackish hair on the frons and face, dark brown pleural hair, and pale, almost white, silky abdominal hair. The female has white facial hair, three grey vittae on the thorax and the abdomen with pale hairs and dense rows of dark bristles across the tergites.

SOKOTRA : Hammadero, 1100 ft, 1 ♂, 18.iv.1967 (*K. M. Guichard*), BM(NH).

Geron sp. ♀

Hesse (1938) has shown that the species of *Geron* are remarkably similar in external characters and can only be distinguished with difficulty except by the characters of the male genitalia. He has also shown that, at least in southern Africa, there are many more species than was formerly believed. It is thus impossible in the present state of our knowledge to identify females from other regions reliably. The present specimens however run to *G. nigrifacies* in Hesse's (1938) key and approximate to his description. From *G. nigrifacies* they differ in that the fore tibiae are paler, the brassy scaling extends over the scutum and the hyaline wings have paler yellowish to yellowish brown veins.

SOKOTRA : Hammadero, 1100 ft, 2 ♀, 8.iv.1967 (*K. M. Guichard*), BM(NH) and author's collection.

These specimens may be conspecific with the pair identified by Becker (1910) as *G. gibbosus* Meigen, which it has not been possible to trace.

Phthiria sp.

Ricardo (1903) reported two male *Phthiria* sp. from Sokotra. No specimens of this genus are present in Guichard's material and unfortunately the specimens collected by Grant can no longer be found in the British Museum.

***Chiasmella sica* sp. n.**

The genus *Chiasmella* was erected by Bezzi (1924) for the single species *brevipennis* Bezzi from Southern Yemen. Doubt has been expressed whether the genus was distinct from *Chionamoeba* Sack, but Greathead (1967*a*) showed that it is a distinct genus of uncertain affinities, possibly closest to the Tomomyzinae in which he provisionally included it. The present species agrees in most characters with *C. brevipennis*, differing most notably in that the wing has an infuscated fore border, and that the tomentum and hair on the frons is gold in the male. It is a darker, more powerfully built species resembling a Therevid in appearance.

♂. *Head* : black, but frons red-brown and buccal rim yellowish. Occiput above and vertex covered in brown tomentum and blackish brown hair, frons with dense glittering gold tomentum and fine gold hairs, face with greyish tomentum and white hair and lower part of occiput with white hair, which is flattened and adpressed at the margins of the eyes. Antennae with first segment brown, second and third blackish, hairs pale yellowish. Styliform part of third longer than in *C. brevifacies*, equal in length to that of the rest of the antenna. Proboscis and palpi black, labella brown, hairs colourless. *Thorax* : black ; dorsal surface with dark brown tomentum, pale yellowish hairs on the anterior half, blackish ones on the posterior half, and with thin reddish gold hairlike scales. Notopleural stripe consists of an ill-defined band of white scaly hairs continuing around the margin of the scutellum as small white scales. Pleurae with white tomentum and white scaly hair. Macrochaetae strong, reddish gold. *Legs* : coxae and basal three-quarters of femora black, remainder yellow-brown but tarsi darker. Basal part of legs, to apices of femora, with dense white hair and scales, apices of femora and tibiae with yellow scales, tarsi with brown scales. Spines and spicules black, fore femora unarmed, mid with spines only in apical third, hind in apical two-thirds. *Wings* : hyaline with a brown infuscation in the costal, sub-basal, first basal, basal half of marginal and basal part of first submarginal cells to just beyond the middle crossvein. Venation as *C. brevifacies*, except that the second vein originates at a distance of about twice the length of the middle crossvein from that vein. Halteres yellow brown, with apices of knobs paler. *Abdomen* : black, hair at sides of first tergites and curved margins of succeeding tergites white. Median part of first and dorsal part of succeeding tergites with dark reddish gold scales and a posterior fringe of white scales. Lateral and ventral surfaces with white scales, hind margins of segments with tiny black hairs, longer and more conspicuous dorsally and towards the apex. Sternites almost entirely concealed by the recurved tergites. Hypopygium not examined.

Length of body 10 mm, of wing 8 mm.

♀. As male except that the head is entirely black and the gold on the frons is replaced by sparse whitish tomentum and pale yellowish white hair. Ovipositor concealed by a mass of pale gold hair.

Holotype ♂. SOKOTRA : Jebel Ommari, Hadibo Plain, 600 ft, 22.iii.1967 (*K. M. Guichard*), BM(NH).

Paratypes. SOKOTRA : Hadibo Plain, 2 ♀, iii.1967 (*K. M. Guichard*), BM(NH) and author's collection.

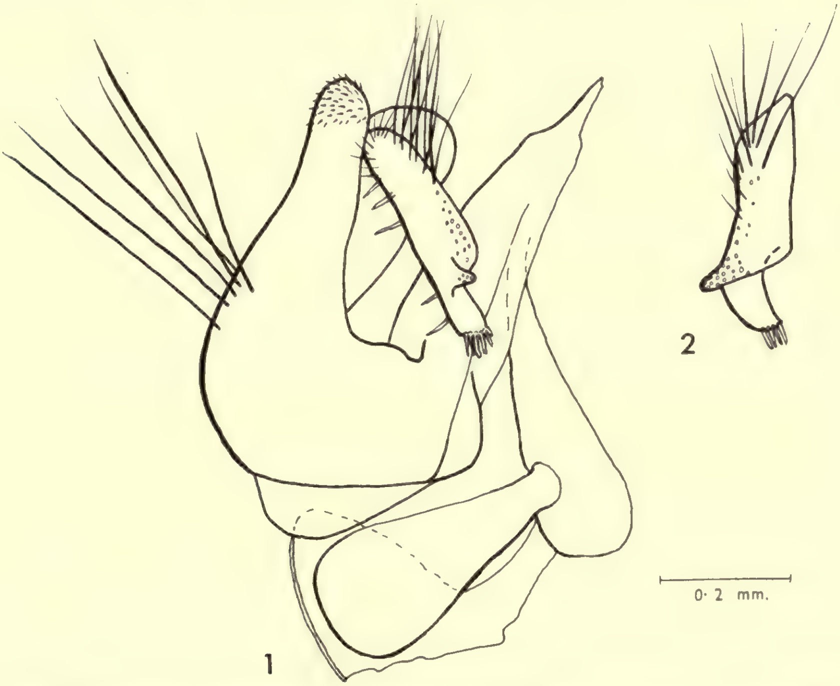
Petrorossia sokotrae (Ricardo) **comb. n.**

(Text-figs. 1–2)

Anthrax sokotrae Ricardo, 1903 : 367.
Thyridanthrax sokotrae (Ricardo) Bezzi, 1924 : 22.

This species, which clearly belongs to the genus *Petrorossia*, was unaccountably listed by Bezzi (1929) under *Thyridanthrax*. It is one of the largest species of the genus but very variable in size ; the present specimens range between 5 and 12 mm. It belongs to the *P. fulvipes* Loew section of the genus but lacks a distinct wing pattern, the wings being tinged brownish, darker at the base and along the fore border and identical in both sexes.

Head : black, with grey tomentum except on the vertex and upper part of the frons, which are velvety black. Ocellar tubercle prominent, vertex almost three times its width in the male and only slightly wider in the female, and with a deep sulcus behind the ocellar tubercle separating the inflated halves of the occiput. Hairs on vertex, frons except for a few at the base of the antennae, and on the upper part of the sides of the occiput to the level of the antennae, black, hairs at the base of the antennae and on the face reddish golden, remaining parts of occiput with gold hairs and with short pale yellowish hairs below. Antennae black with a reddish tinge and grey tomentum, hairs black, first segment large, almost as long as second and basal part of third combined, third with a short conical basal part sharply marked off from an elongate stylar part 3 times its length, style jointed at two-thirds of the distance from its base and with a short pale spicule at the apex. Proboscis brown, with golden hairs, broad, only slightly longer than the buccal cavity. Palpi short, black, with long golden hairs. *Thorax* : black with heavy grey tomentum on the pleura. Hairs of collar, humeral callus and mesepimeron rich golden, hair on metapleuron pale gold, scalelike, macrochaetae and fine scattered hairs on dorsal surface black. Dorsal surface also with short adpressed golden scalelike hairs. *Legs* : coxae blackish brown with grey tomentum and golden hair. Remainder red-brown, with the tips of the tarsi darkened. Hairs and scales golden except for an admixture of black scales on the hind femora in the middle above, and towards the apices of the hind tibiae in the female ; in the male this blackening is more extensive with black scales and even black cuticle at the base of the femora. Spines and spicules black. Middle and hind femora with antero- and postero-ventral rows of small black spines. Claws black with brownish bases. Pulvilli well developed, whitish. *Wings* : greatly narrowed at base, alula absent, anal lobe extremely narrowed at base. Membrane brownish glistening darker at the base and along the fore-border. Veins brown. Upper branch of third vein sometimes with a short appendix. Venation normal. Squamae small, brownish tinged, with whitish fringes. Halteres with brown stalks and paler brown to ivory knobs, flattened. Abdomen elongate, flattened, reddish with black on tergites above except for their hind margins and the apical, sixth, tergite which is entirely red. First tergite covered with dense golden hair, and with dense flattened hair of the same colour below the scutellum and along the hind margin. Remaining tergites with sparse fine black hair and elongate gold scaly hairs. Sternites with gold hair and scales. Hypopygium (Text-figs.



FIGS. 1–2. *Petrorossia sokotrae.* 1, Lateral view of hypopygium ; 2, apical view of telomere.

1 & 2) red. Telomere large and with unusual thick bristles on the dorsal surface and at the apex. Aedeagus and accessory structures less elaborate than in other species so far illustrated. Dense gold hair in the apical cavity concealing the ovipositor.

Length of body 7–13 mm, of wing 6–12 mm.

SOKOTRA : Adho Dimellus, 2800 ft, 5 ♂, 1 ♀, 24.iv.1967 (*K. M. Guichard*), 1 ♀ with same data except caught on 25.iv.1967, BM(NH) and author's collection.

Ricardo's type-series (loc. cit.) were captured at Homhil, Hadibo Plain, Addah Valley, as well as Adho Dimellus during January and February.

Anthrax fuscipennis (Ricardo)

Argyramoeba fuscipennis Ricardo, 1903 : 366.
Anthrax fuscipennis (Ricardo) Becker, 1910 : 132.

Becker (1910) placed his *A. dentata* as a synonym of *A. fuscipennis* ; as thus accepted the species is widespread in the Mediterranean region, Arabia and north eastern Africa. Although many species of *Anthrax* are widespread and subject to variation in details of the colour pattern, this interpretation of the species should be treated with caution until the hypopygia of males from a number of localities can be checked with those of males from Sokotra. Unfortunately this is not yet possible as no male specimens have been captured on the island. The form of the hypopygium of material from northern Ethopia has been illustrated (Greathead, 1967*a*).

SOKOTRA : Hadibo Plain, foothills 500 ft, 1 ♀, 30.iv.1967 (*K. M. Guichard*), Hadibo Plain, 1 ♀, iv. 1967 (*K. M. Guichard*), author's collection.

Ricardo's type-series were captured at Adho Dimellus and on the Hadibo Plain during January and February and Becker reported the species from Ras Shoab during the same months.

Anthrax aygulus Fabricius

Anthrax aygulus Fabricius, 1805 : 121.

This species is now known to be widespread in the northern part of the Ethiopian Region. It has not previously been reported from Sokotra.

SOKOTRA : Hadibo Plain, 1 ♂, iv.1967 (*K. M. Guichard*), BM(NH).

Spogostylum sp.? ***ventrale*** Bezzi

Spogostylum ventrale Bezzi, 1924 : 174.

Three female specimens of a species of *Spogostylum*, in rather poor condition, appear to belong to *S. ventrale* Bezzi ; however as the species of this genus are notoriously difficult to identify on external characters and many are apparently restricted to small areas and replaced by closely similar species in adjoining areas, the identification is regarded as provisional.

ABD-EL-KURI : Jebel Saleh, 1000–1500 ft, 3 ♀, 7.v.1967 (*K. M. Guichard*), BM(NH) and author's collection.

Hemipenthes inauratus (Klug)

Anthrax inauratus Klug, 1832 : No. 1.
Thyridanthrax inauratus (Klug) Bezzi, 1924 : 204.
Thyridanthrax inauratus (Klug) ; Engel, 1932–7 : 534.
Hemipenthes inauratus (Klug) Bowden, 1964 : 98.

H. inauratus is now known from localities in Ghana (Bowden, 1964) east to Somalia (Bezzi, 1924) and from Arabia (Klug, 1832) but has not previously been reported from Sokotra. It is one of the most beautiful Bombyliidae and is at once recognized by the purplish black head and thorax, dimidiate black wing pattern and golden scaling of the dorsal surface of the abdomen. The Sokotra specimens fall within the variation indicated in the quoted descriptions and are thus not morphologically distinct from continental specimens.

SOKOTRA : Suk, sea-level, 1 ♂, 1 ♀, 2.v.1967 (*K. M. Guichard*), BM(NH).

Villa dioscoridae **sp. n.**

(Text-figs. 3–5)

Anthrax hottentotta Linnaeus, 1758 : 590 ; Ricardo, 1903 : 368 [Mis-identification].
Hemipenthes circumdatus Meigen, 1820 : 143 ; Becker, 1910 : 133 [Mis-identification].

Recent work, taking a more critical view of *Villa* spp. and making use of the characters of the hypopygium, has suggested that there are more species in the *hottentotta* – *circumdata* group than was formerly recognized (Lyneborg, 1965). Ricardo (1903) even regarded *circumdata* as a synonym of *hottentotta*. For the present purpose it is sufficient to state that the Sokotran species is distinct and not a form of one of the Palaearctic members of the complex. Neither is it conspecific with the allied African species *galla* Greathead (1967*a*) to which it is closest.

From all the other species of the complex it differs in the brighter, more golden and less yellow pubescence, and the more clear cut, contrasting black and yellow banding of the abdomen, in having black hair on the face, black scales only on the legs, and black bands of scales across the sternites.

Holotype ♂. *Head :* black, as *V. hottentotta* (*sensu* Engel, 1932–7) or *V. galla*, except that all the hairs and scales on the frons and face are black, only those on the occiput being yellow and that the third antennal segment is tinged reddish. *Thorax :* similar to the other species but the hairs shorter than that of *V. hottentotta* and more richly coloured than either species ; that of the collar, dorsal surface and prealar callus deep golden yellow with a reddish tinge, that on remaining parts of the pleura straw-coloured. *Legs :* dark reddish, clothed in black scales and hairs except coxae ; fore and mid coxae with yellow hairs on basal half and black hairs and bristles on apical half, hind coxae mainly with yellow pubescence and only a few blackish bristles at the apex. *Wings :* veins darker, blackish, basal comb covered in black scales except for a patch of silvery ones at the base in addition to the silvery ones of the 'epaulette'. Venation normal. Squama opaque white with a pale yellow fringe. Halteres pale yellow-brown with a cream knob. *Abdomen :* hair short as *V. galla* but scales more distinctly yellow and denser, so that the pattern of light and dark bands is sharper. First tergite with shiny black scales, second with pale straw-yellow scales on basal third, remainder black, third with a narrow band of pale scales at the base, remainder black, fourth basal two-thirds pale, apical third black, fifth and sixth black with fringes of pale scales and tufts of long black ones at the sides, seventh with pale scales fringed with long black ones. Sternites : only fourth entirely covered in pale scales, first to third with black ones in middle and fifth to seventh black with pale fringes. Hypopygium, (Text-figs. 3, 4 & 5), with black hair, very similar to the other closely allied species but the accessory structures broader and with deeper wing-like flanges.

Length of body 18 mm, of wing 16 mm.

Paratype ♀♀. *Head :* as male but vertex slightly wider and scales on face beneath the black hair yellow. *Thorax :* hair longer and denser. *Legs :* tending to less extensively black vestiture on coxae and in some with a few yellow hairs and scales at the bases of the femora. *Wings :* as male but pale scales at base of comb white and ' epaulette ' blackish. *Abdomen :* hairs longer and denser, pattern as male but with a tendency for the pale bands to be broader and wider at the sides than in the middle. Ovipositor reddish with yellow hair and about eight reddish spines on each side.

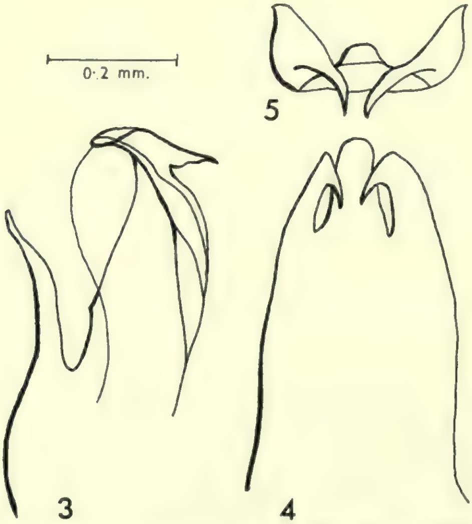
Length of body 16–19 mm, of wing 9–17 mm.

Holotype ♂. SOKOTRA : Adho Dimellus, 2800 ft, 25.iv.1967 (*K. M. Guichard*), BM(NH).

Paratypes. SOKOTRA : Alilo Valley, 3000 ft, 1 ♂, 1.xi.1899 [*sic*] ; Alilo Valley, 1 ♀, 1.ii.1899 ; Homhil, 1500 ft, 4 ♀, 20, 22, 25.i.1899 ; Adho Dimellus, 3500 ft, 1 ♀, 7.ii.1899 ; Goahal Valley, 1 ♀, 16.i.1899 (all collected *W. R. O. Grant*), all in BM(NH) ; Hamadero, 1100 ft, 1 ♀, 8.iv.1967 (*K. M. Guichard*), in author's collection.

Two females from Abd-el-Kuri representing an isolated population have yellow scales on the frons as well as the face, yellow hair on the face except on the midline, hair shorter and paler more straw-coloured and (dorsal surfaces denuded) abdominal pattern less sharp with scattered yellow scales among the black ones. From above these females bear a close resemblance to *V. galla*.

ABD-EL-KURI : 2 ♀, 8.v.1967 (*K. M. Guichard*), BM(NH) and author's collection.



FIGS. 3–5. *Villa dioscoridae*. 3, Lateral view of aedeagus ; 4, apical view of accessory structures ; 5, dorsal view of same.

Thyridanthrax argentifrons (Becker) **comb. n.**

Hemipenthes argentifrons Becker, 1910 : 133.

Becker (loc. cit.) described the species from two males. The present material consists of three rather denuded females, which agree more or less with Becker's description except that there are few silver scales on the posterior abdominal tergites. As such characters are liable to sexual dimorphism (e.g. *T. cunamae* Greathead, 1967*a*) there is little doubt that the present specimens represent the female of *T. argentifrons*. It is one of the group of *Paragus*-like species, as noted by Becker, but is at once distinguished from other known species by the heavy silver scaling on the frons combined with the absence of yellow hair or scaling from the abdomen with its contrasting black and white pattern. The following description is based on the females and includes differences from the males as described by Becker.

Head : black, facial cone bluntly rounded at its apex, face convex, frons two and a half times the width of the ocellar tubercle at the vertex (in male twice the width). Hair on frons and face short, sparse, glistening black. Scales on lower half of frons large, dense, silver, projecting over bases of antennae, on upper part of frons and occiput small, silvery, opalescent, on face similarly opalescent but appearing glistening black when viewed from some angles. Antennae black, first and second segments cylindrical with short black hair except on the underside of first where it is longer, third one and a half times length of first and second, broad at base and closely applied to the second, tapering rapidly to a thick styliform part about two-thirds the length of the segment and terminating in a minute spicule. Proboscis black at base, brown towards apex, tips of labella projecting beyond buccal cavity. Palpi dark brown with brown hairs. *Thorax :* black with a brown tomentum. Hair of collar and notopleural tuft pale brownish yellow, not red-brown as described by Becker for the male. Dorsal surface denuded but according to Becker the males have red-brown hair and metallic golden scales. Notopleural stripes well developed, white, metapleural tuft and plumula also white. Remaining areas of pleura bare or possibly denuded. Prosternum with a row of stiff black hairs. Macrochaetae long, robust, black. *Legs :* black. Coxae with stiff black hair, femora with sparse fine brown hair below, spines and claws black and scales glistening black. Fore and mid femora unarmed, hind with three to four spines on the underside at the middle and one subapical one. *Wings :* hyaline. Veins brown, basal hook and vestigial basal comb black. Venation ; middle crossvein at basal third of discoidal cell, which is small and narrow, so that the posterior cells are long, contact of third and fourth posterior cells with discoidal cell about equal. Squama brownish at base, yellowish at margin, with a fringe of translucent white scales. *Abdomen :* black with glossy black scales and stiff black hair at the sides and across the hind margins of the tergites, except for the first which has white hair and two bands of white scales, a narrow one along the hind edge of the first tergite [on second according to Becker] and a broader one across the anterior third of the third tergite ; however the fourth to seventh tergites are badly denuded and there are traces of silver scales intermixed with the black ones. Sternites black, first four with opalescent whitish scales and brownish hair, remainder with glossy black scales and black hair. Ovipositor exposed, with five reddish spines on each side.

Length of body 5–7 mm, of wing 5–7 mm.

SOKOTRA : Jebel Omari, Hadibo Plain, 600 ft, 2 ♀, 22.iii.1967 (*K. M. Guichard*) ; Kalinsiya, sea-level, 1 ♀, 26.iii.1967 (*K. M. Guichard*), BM(NH) and author's collection.

The syntypes, two males, were collected at Ras Shoab in January.

Thyridanthrax sp. ? ***argentifrons*** (Becker)

Three of the four female specimens from Abd-el-Kuri identified by Ricardo (1903) as *Anthrax* sp. have been examined. They are all badly denuded, rather faded and greasy, which makes certain identification impossible, but the general close resemblance to the preceding species suggests that they probably belong to it or to a divergent subspecies developed in response to isolation on Abd-el-Kuri.

They differ from *T. argentifrons* females in that they are larger, 9–10 mm, the cuticle is not completely black but tends to have reddish areas, antennae dark reddish, the upper part of the pleura are densely covered in yellowish brown hair, the legs are dark reddish, the hair at the base of the abdomen is pale yellowish, the terminal abdominal segments show signs of extensive silver scaling and that the sternites are all covered in pale hair and silvery scales.

ABD-EL-KURI, 2 ♀, 22.ii.1899 ; 1 ♀, 5.xii.1898 (*W. R. O. Grant*), BM(NH).

Thyridanthrax alatus (Becker) **comb. n.**

Hemipenthes alatus Becker, 1910 : 134.

The species was described from a single female and is represented by a female in the present collection. It is a pale-haired species with brown areas on the body and a shiny black vertex with indistinct ocellar tubercle, a combination of characters allying it with *T. capella* Greathead and *T. pallescens* Greathead, a species-group which seems, as far as it has been recognized, to be characteristic of the desert areas bordering the Palaearctic and Ethiopian regions (Greathead, in press).

Head : frons to region of antennae, and a triangular area between the antennae, genae and occiput black, lower parts red-brown, face conical, eye indentation barely indicated, bisecting line very short, vertex broad, three times the distance between the posterior ocelli in width, ocellar tubercle indistinct. Vertex glossy black, bare except for sparse black hairs, frons with sparse black hair on the black area and fine opalescent scales, face and pale parts with short yellowish hair and opalescent scales except for a tuft of short black hairs at the apex of the facial cone, occiput with short pale yellowish hair and also with opalescent scales. Antennae ; first segment red, remainder black, hairs on first and second segments black above, brownish yellow below, third broad, strap-like, tapering sharply to a minute style at the apex, twisted so that it is vertically flattened at the base and horizontally flattened at the apex. Proboscis projecting, labral part red, labial part black, palpi brown elongate with yellowish hairs. *Thorax :* black but with extensive brownish areas on the pleura, and scutellum red except for the extreme base. Hairs of collar and pleura pale white, tinged yellowish, dorsal surface denuded but showing traces of short golden brown hair and fine scales. Scales among the hairs at the sides of the dorsal surface white, tinged buff. Macrochaetae yellow-brown. Metapleura and hypopleura bare. *Legs :* black, except for upper surfaces of femora and coxae, which are brown. Hair and scales on coxae white, spines, spicules and scales on remaining parts black. Claws black with red bases. *Wings :* base, entire costal, basal and anal cells and marginal and discoidal cells to level of middle crossvein tinged pale yellow, remainder smoky hyaline. Veins yellow-brown. Upper branch of third vein straight at base and bent at right angles at the first bend. Discoidal cell truncate, the vein between it and the second basal cell long almost as long as the cell is wide at the wing margin, contact of discoidal and fourth posterior cells equal to that of the latter with the second basal cell. Basal hook brown, comb black with whitish scales. Squama and alula translucent yellowish with white fringes. *Abdomen :* black along the midline and bases of tergites, and sternites merging to red-brown on the remainder giving the appearance of red-brown with an ill defined black median stripe. Hair on first segment and sides of basal half of second segment white, fine scattered hair on dorsal surface of segments 2–4 and hair rows at the margins of tergites on the dorsal surface black, those at the sides and on the apical segments yellowish ; scales at the bases of the tergites white gradually becoming yellow at the apex, however the pattern is difficult to distinguish as the specimen is rather denuded. Sternites with white scales and fine sparse yellowish hairs. Ovipositor red-brown with three weak spines at each side.

Length of body 11 mm, of wing 9 mm.

ABD-EL-KURI : Jebel Saleh, 1000–1500 ft, 1 ♀, 7.v.1967 (*K. M. Guichard*), BM(NH).

Becker's type is from Sokotra, February 1899.

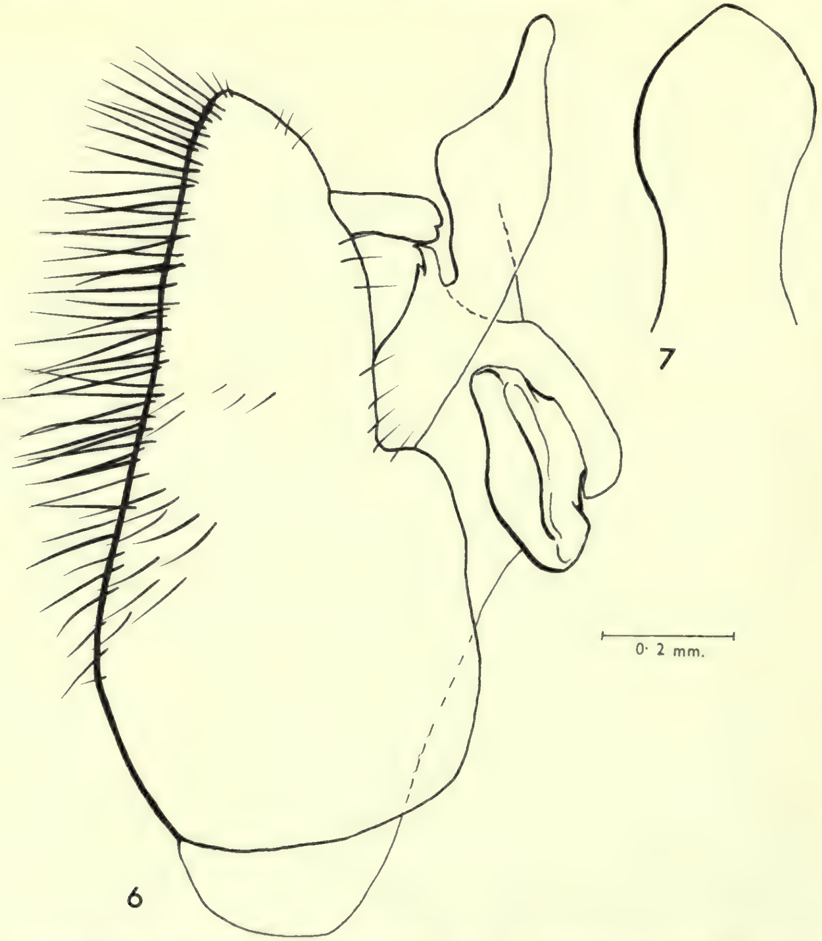
Exoprosopa punctipennis Ricardo

(Text-figs. 6, 7)

Exoprosopa punctipennis Ricardo, 1903 : 364.

This seems to be one of the commonest and most striking Bombyliidae from Sokotra. It is very similar in appearance to *E. punctulata*, a common and widespread species on the African mainland. It differs in being larger (10–15 mm), more brightly coloured and heavily marked, in having dark-haired pleura, in that the abdomen is only obscurely reddish at the sides, and in that a short appendix juts into the discoidal cell from the recurrent angle of the vein separating it from the third posterior cell. None of these differences is an important character, and as it has spicules on the fore tibiae, like *E. punctulata* but unlike most other species of the genus, it is concluded that its resemblance to this species is one of close relationship and that *E. punctipennis* is probably derived from it. Ricardo (1903) draws attention to the appendix jutting into the discoidal cell from the vein dividing it from the third posterior cell. This character, like many minor instabilities of wing venation, does not invalidate the proposed relationship with *E. punctulata*, as an examination of a series of this species shows that this vein is variable in length and angularity and in the development of an appendix in one or both wings. Similarly *E. disrupta* (Walker) which also belongs to the *E. punctulata* group (Greathead, 1967*a* ; *E. disrupta* also has spiculate front tibiae, a point not previously mentioned) shows a tendency to the development of an appendix into the discoidal cell.

Head : brownish black with a reddish buccal rim and a heavy red-brown tomentum. Face conical, its sides and base forming an equilateral triangle in profile. Eyes separated by three and a half to four times the width of the ocellar tubercle in both sexes. Eye indentation barely indicated, bisecting line very short. Hairs sparse, black on vertex, frons, face and underside of head, on frons and face with scattered opalescent scales beneath, occiput with very short brown hairs and dense silvery scales at the posterior margins of the eyes. Antennae with first segment red-brown, two and a half times the length of the second, which is dull brown, shorter than wide, third dull brown, as long as first and second segments together, with a rounded base and tapering to an elongate red-brown style three-quarters the length of the third segment, style with a distinct spicule at its apex. Proboscis black shagreened, as long as the greatest length of the head, thus it is conspicuously projecting. Palpi black with fine black hairs. *Thorax :* black except apical two-thirds of scutellum, which is red heavily dusted with brown tomentum. Hair of collar above between notopleural stripes pale yellow, the hairs darker yellow at their tips, sparse hair on dorsal surface, hair on pleura except upper parts of metapleural tuft, black, also with dense stripes of white scaly hairs along notopleura, upper part of metapleural tuft and plumula white. Scales on dorsal surface very sparse opalescent, macrochaetae black. *Legs :* black including all hairs scales and spines. Fore tibiae spiculate, only hind femora with spines below, these with a complete row. *Wings :* base, costal cell, first basal cell, submarginal cell except broad apical part, basal half of submarginal and second basal cells, extreme base of first posterior cell, basal third of anal and base of axillary cell all infuscated chocolate-brown; also with chocolate-brown spots at the bases of the second and third submarginal, discoidal, second, third and fourth posterior cells. Basal hook and comb black, squama white, its fringe and fringe of alula also white. Venation with veins separating submarginal cells angularly bent, not smoothly curved, vein between discoidal and third basal cell long and contorted, bent twice almost at right angles into the third basal cell (thus giving a broad apex to the discoidal cell) and into the discoidal cell where a short appendix is emitted into that cell. *Abdomen,* ♂ : conical, tergites black, obscurely reddish at the sides, first tergite with white hair except for a line of black hairs along its margin on the dorsal surface, second tergite with white hair at the sides of the basal two-thirds and with a narrow band of white



Figs. 6–7. *Exoprosopa punctipennis.* 6, Lateral view of hypopygium ; 7, dorsal view of aedeagus showing outline of accessory structure.

scales at the base, otherwise with black hair and glossy black scales, third, fifth and sixth tergites also with white basal bands, otherwise tergites with black hair and scales. Sternites dark red with black hair and scales. Hypopygium (Text-figs. 6 & 7) red with black hairs. Very similar to that of *E. punctulata* (Hesse, 1956 : fig. 254) differing only in minor details of shape. ♀ : as male but flattened, not conical, and ovipositor red with five black spines on each side.

Length of body 10–15 mm, of wing 8–14 mm.

SOKOTRA : Hammadero, 1100 ft, 2 ♂, 1 ♀, 8.iv.1967 ; Kalinsiya, sea-level, 2 ♂, 1 ♀, 26.iii.1967 ; Hadibo Plain, foothills, 500 ft, 1 ♂, 30.iv.1967 ; Jebel Omari, Hadibo Plain, 600 ft, 1 ♂, 22.iii.1967 (all collected *K. M. Guichard*), BM(NH) and author's collection.

Ricardo's (1903) type-series were collected at Homhil, Adho Dimellus and Hadibo Plain, December – February. Becker (1910) recorded it from Sokotra, January and February.

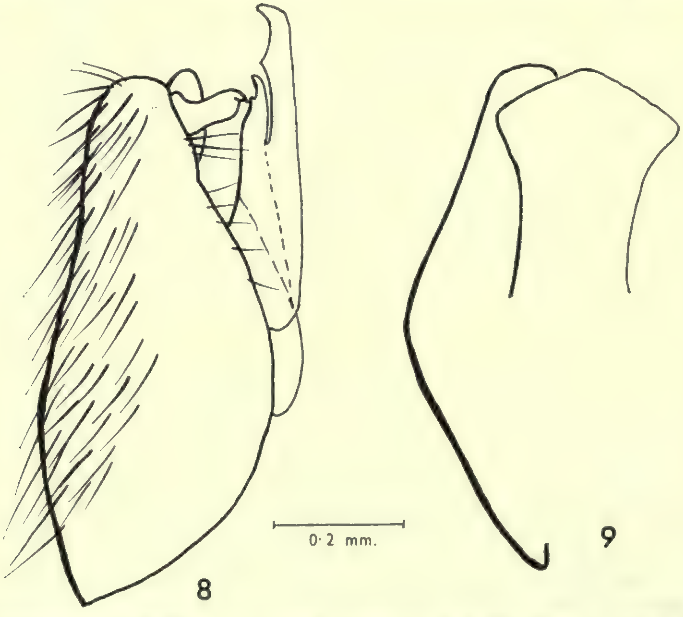
Exoprosopa insularis Ricardo

(Text-figs. 8, 9)

Exoprosopa insularis Ricardo, 1903 : 365.

Ricardo (1903) compared this species with *E. disrupta* but as shown above *E. disrupta* is related to *E. punctulata* and *E. punctipennis* while *E. insularis* lacks the special characters of this group ; in contrast the front tibiae are not spiculate, the proboscis is short and the abdomen black, broad and flattened. Ricardo's other comparison with *E. venus* Wied. [*sic*], in fact *E. venosa* Wied. *sensu* Loew (described by Hesse, 1956, as *E. leucothyrida*), is more apposite. *E. insularis* has the highly contorted venation between the submarginal cells, narrowed first posterior cell, unstable venation tending to emit appendices either into the discoidal or third posterior cells and concentration of the infuscation along the margin of the veins, dark colouring and other body characters of species of the subgenus *Acrodisca* Bezzi. It seems to belong more properly with this grouping than with the *E. punctulata* group. As suggested by Bowden (1964) and accepted by Greathead (1967*a*), there is room for a regrouping of species within the genus, relying more on general similarities than single venational characters which are not always reliable. On this basis both *E. insularis* and *E. leucothyrida* belong in a grouping centred on Bezzi's subgenus *Acrodisca*.

Head : black with brown tomentum, brown around ocellar tubercle and in two stripes running from it to the antennae, genae and buccal rim yellow-brown. Sparse short hairs on occiput above, vertex, frons and face black. Hair at sides of occiput and fringing the posterior margin pale yellow. Scales on vertex and frons glossy black, on face mixed glossy black and dull gold, and on occiput dull gold. Eyes separated at vertex by three times the width of the ocellar tubercle, which is set forward of the narrowest point at the top of the head. Eye indentation straight-sided, shallow, so that the emargination is symmetrical and angular, bisecting line short. Facial cone triangular in profile, the apical angle being almost a right angle. Antennae ; first segment red with black hair, second black about half length of first with black hair, third slightly longer than first two segments together, upper surface straight, lower sloping upwards so that it is conical, with the apex over the circumference of the base, lower surface grooved, black above narrowly red below, style about two-thirds length of the third segment, black and with a reddish spicule at the apex. Proboscis with only the tips of the labella projecting, reddish black with a shiny black heavily shagreened labial sclerite below. Palpi black with black hairs. *Thorax :* black with brown tomentum and a paler median stripe of tomentum along the length of the scutum. Dorsal surface with sparse black hair and shiny black scales. Notopleural stripe and margin of scutellum marked by dull golden elongate scales. Hair on collar and pleura dull brownish gold with an admixture of black hair on the prosternum and lower part of propleura, and also a few fine black hairs on the mesepisternum. Metapleura bare except for the metapleural tuft. Plumula and prealar tuft pale yellowish. Macrochaetae long, fine, black. *Legs :* dark reddish heavily overlaid with shiny black scales, spines and spicules black except that the fine hairs on the fore tibiae and tarsi and the apical segments of the other tarsi are paler yellowish, hair black except for an admixture of dull gold ones on the hind coxae. Claws red at their bases, black apically. Fore femora unarmed, mid with four anterolateral and two posterolateral spines and hind with a complete row of about eight posterolateral spines. *Wings :* opaque greyish, all veins broadly bordered with dark brown, so that only the centres of the wider cells are clear, praediscoidal spot and a fine border running from it to the base of the third basal cell along the vein, and another running along the first vein and ending in a spot at the root of the second, grey. Venation as in *Defilippia* with the apical vein of the discoidal cell sinuous and parallel with the margin but with an angular bend into the third posterior cell, emitting an appendix on some specimens and others with an appendix into the discoidal cell at the bend towards the base. Basal hook and comb black. Squama yellowish grey with a yellow fringe. *Abdomen :* black with obscure reddish areas at the margins of the tergites and on the sternites. First tergite and sides of second and third with dull golden hair and scales (on the reflexed margin below they are black), remaining sparse hair and fringe of scales at the margins of the sclerites black. Scales on second tergite black, with white scales at the anterior corners bordered with yellow scales which extend in a band across the base at the middle ; third segment with the scales on the basal half yellow, darker, more golden where they join the black scales on the posterior half ; remaining segments with intermixed black and golden scales, the latter denser towards the posterior margins, tending to give



FIGS. 8–9. *Exoprosopa insularis.* 8, Lateral view of hypopygium ; 9, dorsal view, outline of paramere and aedeagal accessory structure.

an irregular banded appearance. Sternites with sparse yellow hair and golden scales. Hypopygium (Text-figs. 8 & 9), dark red with golden hair. Ovipositor with five strong red spines at each side and sparse black hair.

Length very variable, the two males 8 mm and 10·5 mm, wings 8 mm and 11 mm. The females 8 mm and 14 mm and their wings 8 and 14 mm also.

SOKOTRA : Adho Dimellus, 1 ♂, 24.iv.1967 (*K. M. Guichard*) ; Hammadero, 1 ♂, 2 ♀, 18.iv.1967 (*K. M. Guichard*), BM(NH) and author's collection.

Ricardo's type was caught at Jenaagahan in January and Becker (1910) reported it from Sokotra in January and February.

Family **NEMESTRINIDAE**

Atriadops cinnamonea Brunetti

Atriadops cinnamonea Brunetti, 1929 : 5.

This species was described from Malawi (Nyasaland) and the only other record is a single male from Tanzania, Ilonga, at light, 20.ii.1965 (*I. A. D. Robertson*), the hypopygium of which has been illustrated by Greathead (1967*b*).

SOKOTRA : Hammadero, 1100 ft, 2 ♂, 18.iv.1967 (*K. M. Guichard*), BM(NH) and author's collection.

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BRITISH MUSEUM
[illegible] JAN 1970
NATURAL HISTORY

L. A. MOUND

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 4
LONDON : 1970

THYSANOPTERA FROM THE SOLOMON ISLANDS

BRITISH MUSEUM
NATURAL H

BY

LAURENCE ALFRED MOUND

Pp. 83–126 ; 1 *Map,* 43 *Text-figures*

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical Series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

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This paper is Vol. 24, *No.* 4, *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

World List abbreviation :
Bull. Br. Mus. nat. Hist. (Ent.)

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 22 *January*, 1970 *Price* £1 6*s.*
(£1·3)

THYSANOPTERA FROM THE SOLOMON ISLANDS

By L. A. MOUND

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SYNOPSIS

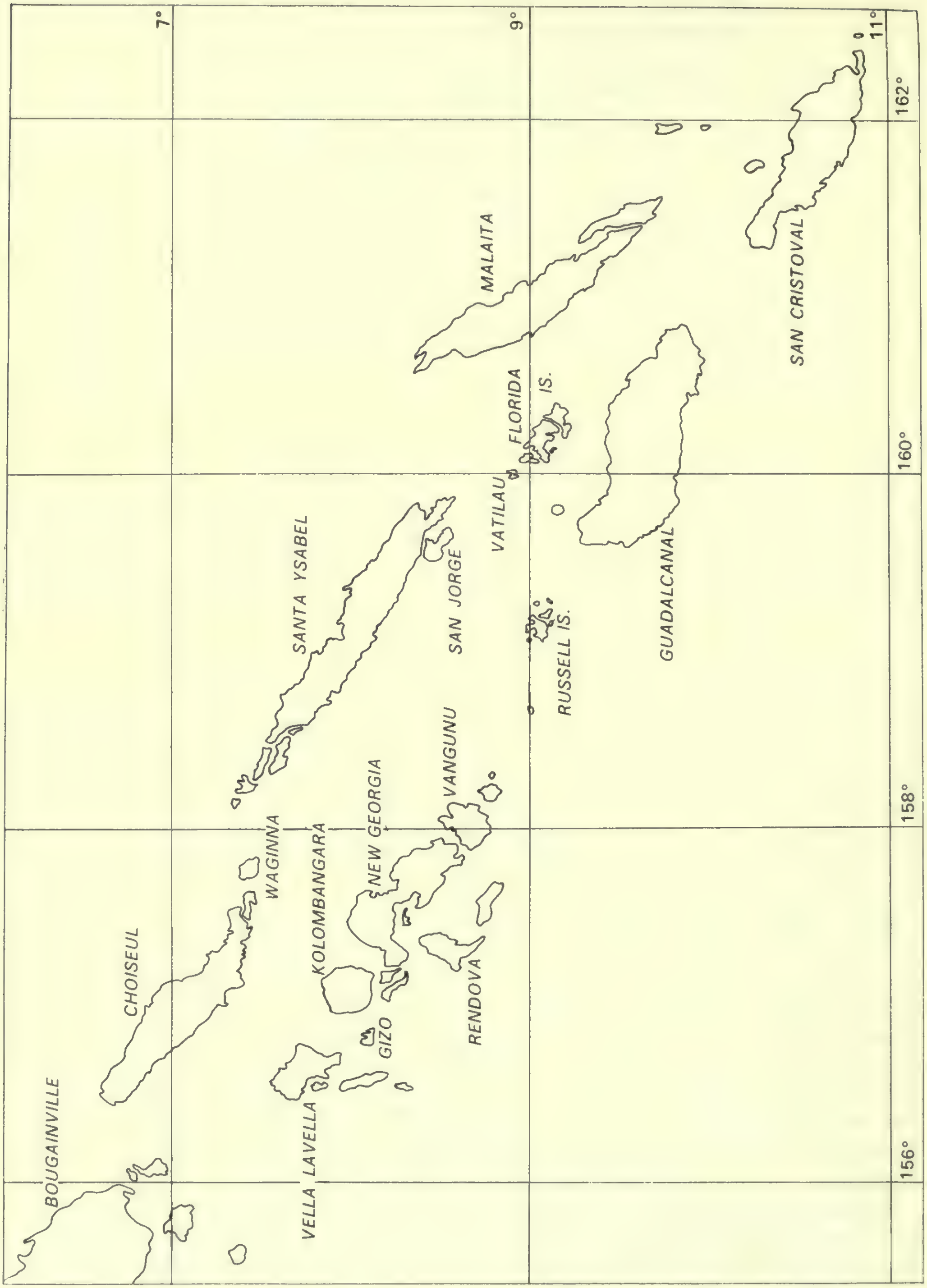
Thirty species of Thysanoptera are recorded from the Solomon Islands. Nine of these species are widespread across the world, two are widespread in the Western Pacific, two are known from other parts of Melanesia, and seventeen are known only from the Solomons. Fifteen new species are described, four new genera are defined, and seven new synonymies are established. The new species were collected in leaf-litter and a discussion is included on the structure, collecting methods and distribution of leaf-litter species.

INTRODUCTION

ONLY two species of Thysanoptera have been described from the Solomon Islands (*Euoplothrips carcinoides* Hood, 1937 and *Mecynothrips snodgrassi* Hood, 1952), and the present author has seen published records of only three other species from this area (*Haplothrips priesnerianus* Bagnall in Mound, 1968, and *Thrips tabaci* Lindemann and *Selenothrips rubrocinctus* (Giard) in Lever, 1968). In the present account a further twenty five species are recorded, of which fifteen are described as new, and notes are included of fragmentary material of several other species which have also been seen during the course of this work.

Most of the material discussed here was extracted from leaf-litter on the ground through berlese funnels, either by the government entomologist, Dr. John Greenslade (P.J.M.G.), or by Mr. P. N. Lawrence (P.N.L.) who visited the Islands with the Royal Society Expedition in 1965, or by collectors from the Bernice P. Bishop Museum, Hawaii. A single gall containing very large numbers of a single species was collected by Mr. J. Grant on the Royal Society Expedition, and three species were submitted for identification to the Commonwealth Institute of Entomology by the Solomon Islands Department of Agriculture. Unless stated to the contrary the material referred to in this paper is deposited in the British Museum (Natural History).

Thrips were extracted from moss, soil, leaf-litter and plant debris through eight-inch diameter plastic funnels. Several samples were taken at each site and these were placed in funnels beneath electric lights. The insects dropped into tubes of


7°
9°
11°
162°
160°
158°
156°
MALAITA
SAN CRISTOVAL
FLORIDA IS.
VATILAU
GUADALCANAL
SANTA YSABEL
SAN JORGE
RUSSELL IS.
VANGUNU
NEW GEORGIA
WAGINNA
KOLOMBANGARA
CHOISEUL
RENDOVA
GIZO
BOUGAINVILLE
VELLA LAVELLA

MAP 1. The Solomon Islands (N.B., the Florida Islands are also known as the Nggela Group).

alcohol pushed on to the bottoms of the funnels. The extractions were carried out at Kukum Agricultural Research Station, near Honiara, Guadalcanal, not at the various collecting sites, and Dr. Greenslade has suggested that at least some of the species were attracted either to the lights or to the alcohol of the funnels. This is probably true of some thripid specimens, but most of the Phlaeothipidae recorded here are apparently leaf-litter dwelling species and some were accompanied by larvae and apterae.

Because most of the species discussed here were extracted from leaf-litter, it is not possible to discuss the thrips fauna of the Solomon Islands in general terms. The few species known from surrounding areas were mainly collected from flowers or green leaves or dead wood, and these habitats have not been examined for thrips in the Solomons. Conversely the thrips of leaf-litter are unknown from Fiji and New Guinea, although some species have been described from Indonesia. However Moulton (1944) does not record the genera *Ecacanthothrips*, *Machatothrips* and *Mecynothrips* from Fiji, and in view of the large size of the species and the frequency with which they have been taken in the Melanesian area, it would be reasonable to expect collectors to find them if they were present. These forms may not extend across the Pacific, although *Rhaebothrips* is known from Formosa to Samoa and Eastern Australia. The apparent absence of the conspicuous flower-living Aeolothripidae from the Melanesian area is rather surprising, as this family is well developed in Australia and also occurs in New Zealand, New Caledonia and Southern India. Similarly no Merothripidae were taken in the Solomon Islands, although these inconspicuous thrips are readily taken in leaf-litter in Australia and also occur in New Zealand.

Some species that live in leaf-litter have a rather unexpected geographical range. *Bradythrips hesperus* is now known from Guyana, Southern India and the Solomon Islands, and species of the genus *Psalidothrips* are known from Java, the Solomon Islands and Brazil. The author has recently collected unidentified species of *Allothrips* and *Pseudocryptothrips* in Australia and both these genera occur in North America. These distributions may be natural but could be the result of man's activity. Leaf-litter thrips feed on the fungi associated with dead leaves and it seems likely that such fungi have extensive ranges. Unlike phytophagous insects which are limited by the range of their host plants, these fungus-feeding thrips have a continuous habitat wherever there are dead leaves and a suitably drained soil. However it is likely that man has also influenced the distribution of some species during the last three or four hundred years. The present author has commented elsewhere (1968 : 140) on the possibility that *Nesothrips propinquus* has been distributed around the Southern Hemisphere in hay used on board ships, and it is suggested below that *Hoplandrothrips flavipes* has similarly been distributed in firewood on ships. Lindroth (1957) in an account of the faunal relationships of North America and Europe has produced evidence to show that some species, particularly of carabid beetles, have been distributed by man in the soil and gravel used as ballast on sailing ships. Similar studies have not been made in tropical regions but ballast was carried by all sailing ships in varying quantities in order to maintain vessels at a suitable level in the water, thus more ballast was needed with a light cargo than a heavy cargo. Captain Cook records loading the *Endeavour* with eight tons of ' iron ballast ' before leaving England in 1768, but he also records taking on twenty tons of ' stone ballast ' at Tahiti, and unspecified amounts in New Zealand, Eastern Australia and Java (Beaglehole, 1955). Such stone ballast probably included quantities of soil and plant debris. In North Atlantic ports ships were not permitted to throw ballast into the water, as it could have blocked the harbour, but had to offload it on to the quayside. Similar regulations were probably in operation in tropical ports. Once the ballast was on the quay, it was then available to the next ship, so creating the opportunity for organisms to be moved in ballast from port to port. Although European settlers and plant collectors undoubtedly moved very large numbers of tubs of soil containing plants from place to place, this traffic in ships' ballast is probably more important to zoogeographers because of its sheer bulk. Lindroth (1957 : 161) states that according to the records of Poole Harbour in Southern England, 1180 tons of ballast were supplied to ships sailing from Poole to Newfoundland in the year 1815. With the vast tonnage of sailing vessels in operation during the eighteenth and nineteenth centuries there were thus ample opportunities for soil-living organisms to be moved around the world.

There are several morphological characters which seem to be associated with the leaf-litter habitat in the Phlaeothipinae. The species of *Baphikothrips*, *Psalidothrips*, *Mystrothrips* and *Solomonthrips* are bicoloured, usually yellow with one or more transverse brown markings. The wings of most of these species are narrow, not constricted medially, with widely spaced cilia and few or no accessory cilia. *Baphikothrips*, *Psalidothrips* and *Solomonthrips* species have a narrow bell-shaped pelta as in *Adraneothrips* and *Hoplandrothrips* species. Surface reticulation is frequent in leaf-litter species such as *Solomonthrips*, *Mystrothrips* and the Glyptothripini, but it is not restricted to such species nor are all leaf-litter species reticulate, e.g. *Psalidothrips*. An interesting negative characteristic is the apparent absence of oedymerous forms in these species. Fungus-feeding Phaleothripinae living under bark frequently show a very great range of body form, e.g. *Ecacanthothrips*. The leaf-litter species are also fungus-feeders but none of the species referred to here are known to produce strongly oedymerous individuals. The major males of *Solomonthrips greensladei* described below have larger femora with tubercles than the minor males but they do not show any great difference in body size.

Most of the specimens referred to in this paper were treated briefly with 5% sodium hydroxide solution prior to dehydration and mounting in balsam. This treatment facilitates clearing but destroys the hypodermal pigments, and so the notes on colours of the species refer only to cuticular colour. The head lengths which are quoted are based on measurements of total head length from the base of the head to the interantennal projection. The text-figures were drawn at various magnifications, the heads and pronota using a Wild drawing tube and the remainder using a Zeiss camera lucida. Mr. B. R. Pitkin drew text-figures 10–12, 24, 25 and 28–32, and the others were drawn by the author. This paper could not have been completed without the advice and generous loan of material from Dr. H. Priesner of Linz, Miss Kellie O'Neill of the U.S.D.A., Washington, and Dr. Paul Arnaud of the California Academy of Sciences.

THRIPIDAE

Included among the few thripids taken from leaf-litter were two female *Scirtothrips* from Mt. Austen, Guadalcanal, one female *Pseudodendrothrips* from New Georgia, and four females and one male of the *Thrips/Taeniothrips* group from Guadalcanal and Kolombangara. The condition of these specimens was too poor for accurate study below the generic level at the present state of knowledge of the Melanesian fauna.

Chirothrips spiniceps Hood

Chirothrips spiniceps Hood, 1915 : 12–15.
Chirothrips spiniceps Hood ; zur Strassen, 1960 : 175.

This species is probably established in the Solomon Islands. It is known from North America, Mexico and Hawaiian Islands according to zur Strassen.

Material studied. GUADALCANAL : on Rice, 1 ♀, xi–xii.1965 and 1 ♀, 4.xii.1965 (*M. McQuillan*) ; on ?*Brachiaria miliiformis*, 1 ♀, 17.v.1966 (*M. McQuillan*).

Microcephalothrips abdominalis (Crawford)

Thrips abdominalis Crawford, 1910 : 157–159.

This species is widely distributed in the tropics on composite flowers, and may be a pest on sunflowers.

Material studied. GUADALCANAL : Kukum, 1 ♀, 14.vii.1966 (*P.J.M.G.*) ; Mt. Popanamisiu, 1 ♀, x.1965 (*P.J.M.G.*).

Plesiothrips perplexus (Beach)

Sericothrips ? perplexa Beach, 1896 : 216.
Plesiothrips perplexus (Beach) ; Stannard, 1968 : 333–337.

The postocellar chaetotaxy of the specimens listed here compares favourably with American specimens collected on grass in Washington, D.C. The species is widespread on grasses ; the author has collected it in Eastern Australia, but members of the genus need careful study as indicated by Stannard.

Material studied. GUADALCANAL : on Rice, 2 ♀, xi–xii.1965 ; 1 ♀, 3.xii.1965 ; 1 ♀, 4.xii.1965 (*M. McQuillan*) ; on *Eleusine indica*, 1 ♀, 14.v.1966 (*M. McQuillan*).

Selenothrips rubrocinctus (Giard)

Physopus rubrocinctus Giard, 1901 : 263–265.

The red-banded cocoa thrips is spread throughout the tropics as a pest on the leaves of cocoa trees.

Material studied. GUADALCANAL : Mt. Austen, 1 ♀, ii.1966 (*P.J.M.G.*). RENDOVA : 10 larvae on Cacao leaves, 1957 (*E. S. Brown*).

Thrips tabaci Lindemann

Thrips tabaci Lindemann, 1888 : 61–75.

This cosmopolitan species is recorded from the Solomon Islands by Lever (1968 : 8) as a result of thrips having been seen on onions. No material has been studied.

Thrips unispinus Moulton

Thrips (*Epithrips*) *unispinus* Moulton, 1940 : 252.

The type specimens of this species have not been studied but the male and female listed below agree well with the description based on material from Koitaki, New Guinea.

Material studied. GUADALCANAL : Mt. Austen, 1 ♀, 1 ♂, 13.xi.1964 (*P.J.M.G.*).

PHLAEOTHRIPIDAE

In addition to the species which are discussed below under the two subfamilies Phlaeothripinae and Megathripinae, a number of rather poor specimens have been seen which cannot be adequately distinguished. In the author's opinion, no useful purpose is served by describing species on inadequate material in unrevised genera which are known to include highly variable species. Two specimens of undescribed *Androthrips* and fifteen unidentified *Haplothrips* have been seen, also single specimens of *Adraneothrips*, *Diceratothrips*, *Horistothrips* and *Karnyothrips*. Of more interest, but still not worth describing, were three specimens of a genus between *Nesothrips* and *Diceratothrips*, and three specimens of a genus close to *Malacothrips*.

PHLAEOTHRIPINAE

BAPHIKOTHRIPS **gen. n.**

Type-species : *Baphikothrips coloratus* sp. n.

Weakly sclerotized slender species with cuticle bicoloured brown and yellow. Head faintly sculptured dorsally ; eyes large, longer on dorsal surface than ventral ; postocular setae behind inner margin of eyes, shorter than dorsal length of eye ; cheeks weakly incut behind eyes, without major setae ; fore ocellus directed forwards ; mouth cone long, not sharply pointed ; stylets retracted into head, maxillary bridge present. Antennae eight-segmented, VIII not sharply constricted at base. Pronotal setae well developed, epimeral sutures usually incomplete ; praepectus absent ; probasisternal plates with one seta at anterior external angle ; mesopraesternum broadly boat-shaped but weakly sclerotized. Fore tarsi unarmed, legs slender. Lateral mesonotal setae well developed. Metanotum with longitudinal band of reticulation, median setae wide apart. Fore wings slender, weakly constricted medially ; cilia widely spaced, 2–4 accessory cilia ; sub-basal setae well developed. Pelta bell-shaped ; tergites II–VII with two pairs of wing-retaining setae ; tergite IX with accessory seta well developed between B_1 and B_2 : tube shorter than head.

This new genus resembles *Baphothrips* in many ways but in the opinion of the present author this is probably superficial. *Baphikothrips* is very close to *Adraneothrips* but has larger eyes, which are more extensive dorsally than ventrally, and moreover has the postocular setae rather close together. *Adraneothrips* and *Baphikothrips* both have a maxillary bridge, whereas in *Baphothrips* and *Malacothrips* the maxillary guides approach each other at their anterior ends as in more typical members of the Phlaeothripina (Priesner, 1960). It seems more likely that *Adraneothrips* and *Baphikothrips* are derived from *Haplothrips*-like stock by the loss of the praepectus and degeneration of the fore wings in association with their cryptic habitat, than that they have evolved from members of the Phlaeothripini and developed independantly a maxillary bridge. Moreover, these two genera, in common with *Haplothrips*, do not have antennal segment eight sharply constricted into a basal neck as is found in *Baphothrips* and Phlaeothripina such as *Phlaeothrips*, *Ecacanthothrips* and *Hoplandrothrips*. For these reasons the author would place *Adraneothrips* and *Baphikothrips* in the Haplothripini.

KEY TO THE SPECIES OF *BAPHIKOTHRIPS*

1 Antennae very long, segment III about four times as long as wide with two sense cones ; head brown, pronotum and fore legs yellow ; antennal III not much paler than IV ; male not known . . . . . **antennatus** sp. n. (p. 93)

– Antennae shorter, III about twice as long as wide with three sense cones ; head yellow with brown margins, pronotum and fore legs with brown markings ; antennal III yellow, IV brown but V and VI brown with basal third yellow ; male with no fore tarsal tooth, sternite VIII with glandular areas . **coloratus** sp. n. (p. 91)

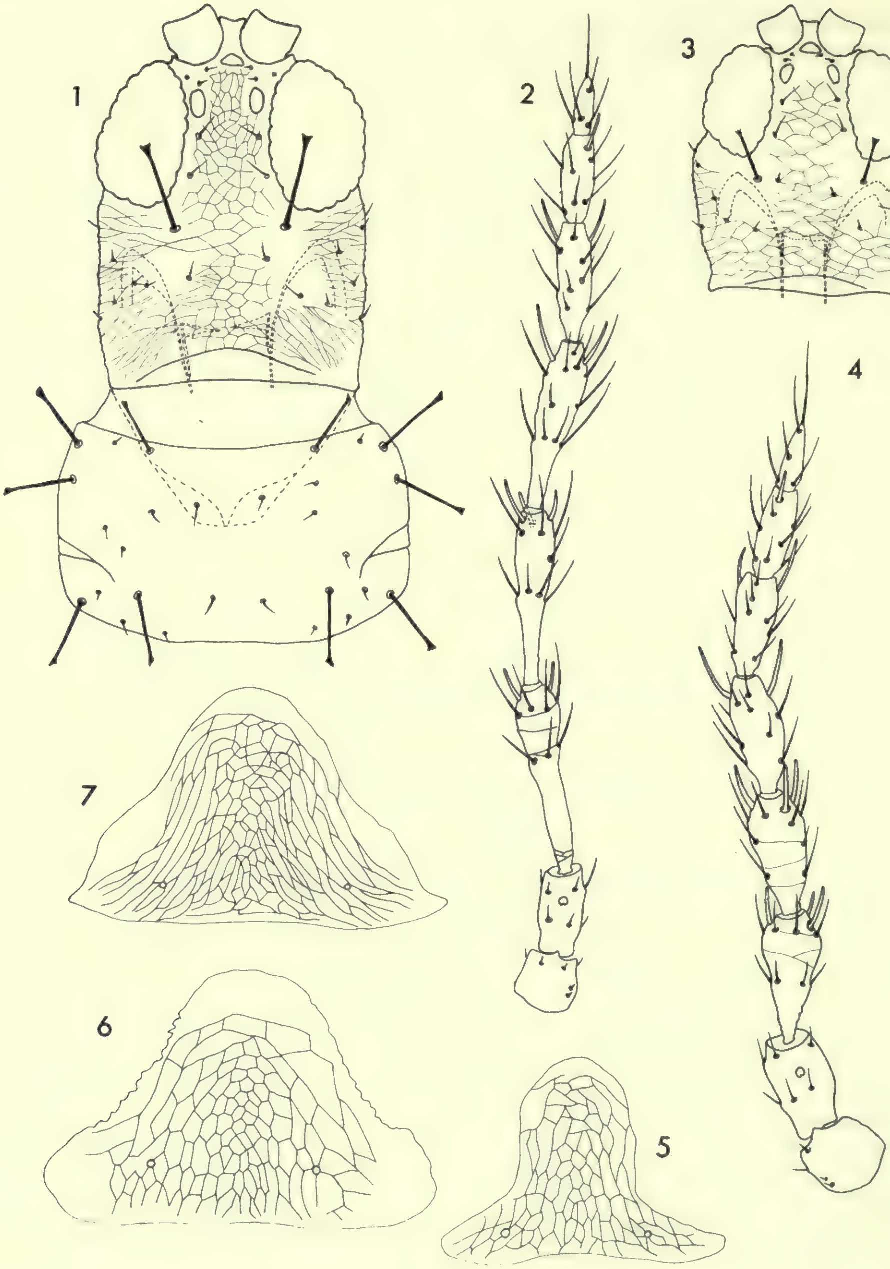
Baphikothrips coloratus sp. n.

(Text-figs. 3 & 4)

♀ (macropterous). Colour yellow with brown markings ; head and pronotum yellow with brown margins ; mesothorax, sides of metathorax, and sides of abdominal segments II–III and V–VI brown ; tube brown ; mid and hind femora and tibiae brown medially ; fore legs with brown shadings along margins ; antennal III and basal third of V and VI yellow ; wings shaded except at extreme apex and median constriction ; major setae pale.

Head with faint sculpture dorsally (Text-fig. 3) ; eyes longer on dorsal surface than on ventral ; antennals III and IV with three sense cones (Text-fig. 4). Pronotum weakly sculptured near posterior margin ; epimeral sutures usually not quite complete ; epimeral setae little longer than other major setae. Mesonotal lateral setae about 20μ long, expanded at apex ; metanotal setae pointed but not acute, 25μ long, 40μ apart. Fore wing narrow, maximum width 55μ, weakly constricted medially, distal width 35μ ; cilia widely spaced, two to four accessory cilia ; sub-basal setae in a straight line, 30μ, 30μ and 45μ long with expanded apices. Pelta bell-shaped, faintly sculptured ; seta B_1 on tergites broadly expanded at apex, more than 50μ long ; tergites with faint sculpture laterally. Sternites with transverse row of about 10 accessory setae 8μ long.

Measurements in microns of holotype with range from four paratypes in parentheses. Body length 1300 (1150–1400). Hind tibia 135 (120–). Fore wing 580 (510–). Head, length 175 (160–) ; width 160 (150–) ; postocular seta 32 (26–35). Pronotum, length 97 (88–100) ; width 190 (180–200) ; epimeral seta 35 (32–40). Tergite IX, B_1 55 (49–) ; accessory seta 42 ; B_2 58 (49–). Tube, length 97 (88–) ; terminal setae 80 (70–). Antennal segments length 26 (23–) ; 35 (–39) ; 52 (49–) ; 52 (49–) ; 42 (39–) ; 39 ; 26 (–29).



FIGS. 1–7. Figs. 1 & 2. *Baphikothrips antennatus* : 1, Head and pronotum (sculpture omitted from pronotum). 2, Left antenna. Figs. 3 & 4. *Baphikothrips coloratus* : 3, Head. 4, Right antenna. Figs. 5–7. Pelta of *Ecacanthothrips* species : 5, *spinipes* gynaecoid female. 6, *spinipes* oedymerous female. 7, *sanguineus*.

Holotype ♀. CHOISEUL : Vasu River, 16.xi.1965 (*P.J.M.G.*), collected with 14 ♀ paratypes.

Other material. FLORIDA IS. : Vatilau, 18 ♀, 2.xii.1965 (*P.J.M.G.*). GUADALCANAL : Mt. Austen, 1 ♀, 8.ii.1966, 1 ♀, 11.ii.1966 (*P.J.M.G.*) ; Mt. Popanamisiu, at 7000 feet in moss forest, 1 ♀, 6.xi.1965 (*P.N.L.*).

The bicoloured antennae and the weak fore wings of this species are similar to *Adraneothrips* species, but very large eyes are not found in that genus except when the eyes are extended on the ventral surface.

Baphikothrips antennatus **sp. n.**

(Text-figs. 1 & 2)

♀ (macropterous). Bicoloured ; head and antennal segments I and II dark brown ; lateral sclerites of pterothorax, abdominal segment IV and tube brown ; anterior margin of abdominal segment V, posterior margin of III, and segments VIII and IX light brown ; pronotum and fore legs yellow ; middle femora dark brown in basal half, hind femora and middle and hind tibiae largely yellow ; wings shaded except at median constriction, dark around sub-basal setae, cilia rather pale ; major setae pale except on dark sclerites ; antennal segments III and IV light brown, V–VIII darker but V and VI with basal stem yellow.

Head rather long with faint sculpture dorsally (Text-fig. 1) ; eyes larger on dorsal surface than on ventral ; antennal segments very long, sense cones small, two sense cones on III and V, three on IV (Text-fig. 2). Pronotal epimeral sutures not complete (Text-fig. 1) ; mesonotal lateral seta 30μ long with expanded apex ; metanotal setae finely acute, 35μ long, 60μ apart. Legs long and slender. Fore wing narrow, maximum width 60μ, weakly constricted medially, distal width 40μ, cilia widely spaced, 2–4 accessory cilia ; sub-basal setae in straight line, 45μ, 50μ and 70μ long. Pelta narrow and bell shaped ; tergites with very faint sculpture laterally ; B_1 and B_2 on IX with apices weakly expanded. Sternites transversely reticulate with about six accessory setae 20μ long.

Measurements in microns of holotype. Body length 1650. Hind tibia 190. Fore wing 700. Head, length 225 ; width 180 ; postocular seta 55. Pronotum, length 130 ; width 240 ; epimeral seta 45. Tergite IX, B_1 100 ; accessory seta 56 ; B_2 100. Tube, length 115 ; terminal setae 115. Antennal segments 32 ; 42 ; 100 ; 90; 95 ; 60 ; 49 ; 30.

♂ (macropterous). Colour rather paler than female, particularly the abdomen. Chaetotaxy and sculpture similar to female but B_2 on tergite IX short and stout ; sternite VIII with an irregular pair of glandular areas laterally ; pseudovirga long and slender as in many *Haplothrips* species.

Measurements in microns of allotype. Body length 1450. Hind tibia 175. Fore wing 600. Head, length 225 ; width 150 ; postocular seta 45. Pronotum, length 120 ; width 185 ; epimeral seta 42. Tergite IX, B_1 100 ; accessory seta 65 ; B_2 32. Tube 105. Antennal segments 30 ; 38 ; 100 ; 100 ; 100 ; 65; 50; 30.

Holotype ♀. SANTA YSABEL : South East Coast, 1000 Ships Bay opposite Lillininia Island, leaf-litter on shore, 20.ix.1965 (*P.N.L.*).

Allotype ♂, and 5 ♀, 4 ♂, 2 larvae collected with holotype.

Other material. SANTA YSABEL : Tatamba, in mangrove litter, 1 ♀, 14.x.1965 (*P.N.L.*) ; San Jorge Island, in litter in gulley, 1 ♀, 22.ix.1965 (*P.N.L.*). CHOISEUL : Malangona, 1 ♀, 4.iii.1964 (*P. Shanahan*) in Bishop Museum Collection.

Because of the very long antennae this species shows less resemblance to *Adraneothrips* than does *coloratus*.

BAPHOTHRIPS Priesner

Baphothrips Priesner, 1933 : 69–70. Type-species : *B. tricolor* Priesner, by monotypy.

The unique female, from soil in Java, upon which this genus is based has been studied and compared with the new species described below. The genus may be defined as follows :—

Cuticle bicolored, brown and yellow ; wings weakly banded. Cheeks incut behind large compound eyes ; postocular setae long ; first ocellus directed forward between bases of antennae ; maxillary stylets close together in middle of head, maxillary bridge absent. Antennae long, eight-segmented, segment IV longest, VIII constricted at base ; three sense cones on III and IV. Pronotum transverse, epimeral sutures complete ; anteroangular setae rather close to midlaterals ; praepectus absent, mesopraesternum well developed but weakly sclerotized. Lateral mesonotal setae well developed. Metanotum reticulate, one pair of long setae wide apart near anterior margin. Fore wings moderately broad, weakly constricted medially, with accessory cilia ; three sub-basal setae in straight line. Pelta weakly sclerotized ; tergites II–VII with two pairs of wing-retaining setae and several lateral setae anterior to B_1 ; tergite IX with accessory seta between B_1 and B_2 well developed, more than half as long as B_1 ; tube shorter than head.

This genus belongs in the Phlaeothripina close to *Malacothrips*, but most of the species placed in that genus are not known to the present author. *Baphothrips* apparently has larger, more rounded eyes, the cheeks are less constricted behind the eyes, and the maxillary stylets are retracted further into the head. *Adraneothrips* and *Baphikothrips* are readily distinguished by the presence of a maxillary bridge and the weaker fore wings. Moreover these two genera do not have the eighth antennal segment constricted into a basal neck and the pronotum is relatively longer.

KEY TO THE SPECIES OF *BAPHOTHRIPS*

1 Dorsal surface of head reticulate, cheeks strongly narrowed to base ; metanotum with longitudinal band of reticulation ; mesonotal lateral setae less than half as long as pronotal posteroangular setae ; head yellow, brown only on anterolateral margins, mesothorax with anterior margin brown ; abdominal segments VIII and IX yellow . . . . **tricolor** Priesner

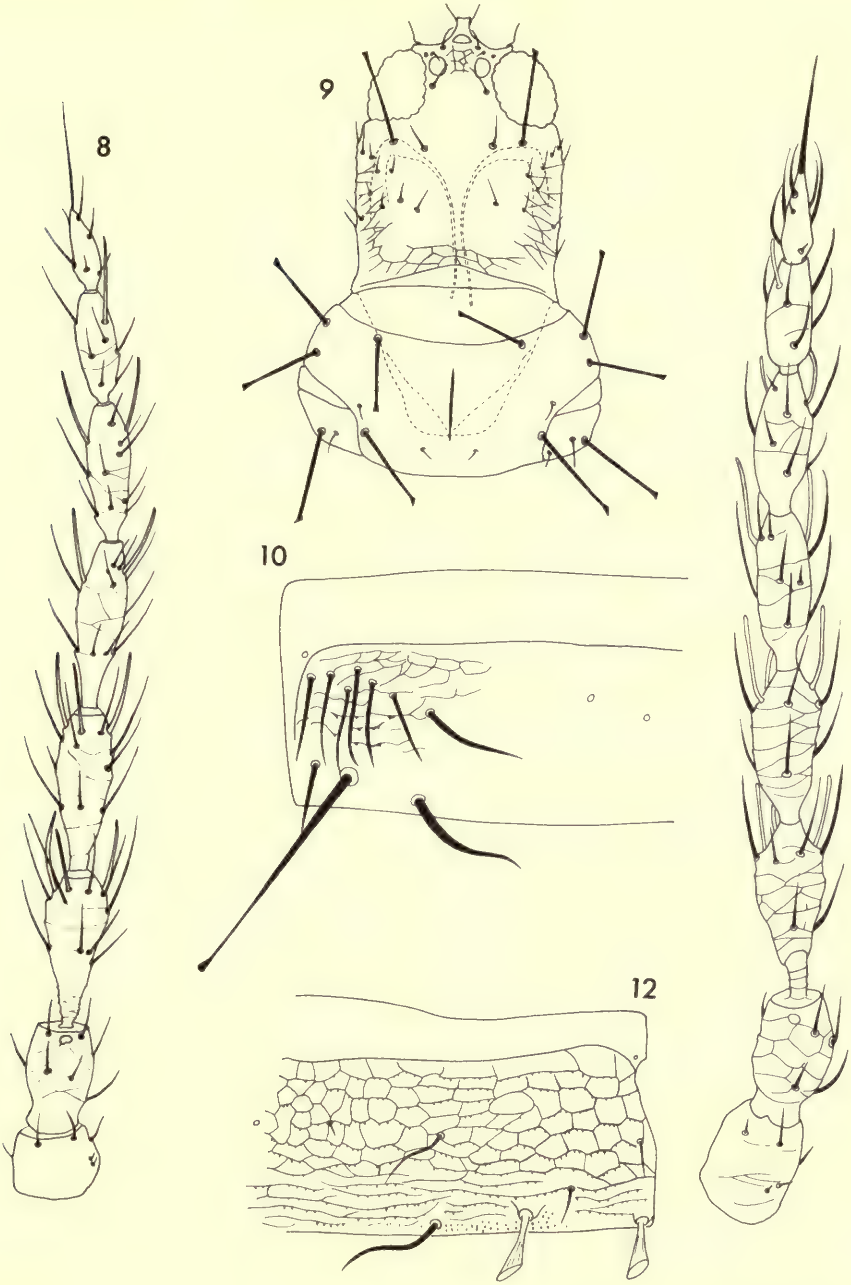
– Dorsal surface of head not reticulate, cheeks weakly narrowed to base ; metanotum weakly reticulate ; mesonotal lateral setae long, more than half as long as pronotal posteroangulars ; head and abdominal segments VII–IX brown, anterior margin of mesothorax yellow . . . . **leios** sp. n. (p. 94)

Baphothrips leios sp. n.

(Text-figs. 8–10)

♀ (macropterous). Bicoloured ; pterothorax, abdominal segments V–VI, all tibiae and tarsi yellow ; dark brown on head and pronotum, antennal segments I and II, tube and abdominal segments VII–IX, II–III and anterior margin of IV ; femora shaded brown medially, fore femora darkest ; antennal segments III–VIII light brown ; major setae light brown ; basal half of wing darker than distal half, cilia dark.

Head weakly sculptured laterally and between ocelli ; postocular setae longer than eyes (Text-fig. 9) ; maxillary stylets retracted deeply into head, close together medially, maxillary



Figs. 8–12. Figs. 8–10. *Baphothrips leios :* 8, Left antenna. 9, Head and pronotum. 10, Tergite IV. Figs. 11 & 12. *Mystrothrips dilatus :* 11, Left antenna. 12, Tergite III.

guides well developed, bridge absent ; ventral surface of head with a pair of long setae basally and another pair between the eyes ; antennae long, sensorium on II near apex (Text-fig. 8) ; mouth cone extending two thirds across prothorax, acute but with broadly rounded labrum.

Pronotum short and wide (Text-fig. 9) ; probasisternal plates well developed with five setae along anterior margin. Mesonotal lateral setae 50μ long, apex expanded. Metanotal setae finely acute, 65μ long, 100μ apart. Fore legs long, without armature. Wing broadest (80μ) just beyond sub-basal setae, weakly constricted medially, with seven accessory cilia ; sub-basal setae long (65μ ; 80μ ; 100μ), expanded apically.

Pelta weakly sclerotized, reticulate, broadly bell-shaped ; tergite II with an irregular group of 12 or more setae laterally anterior to B_1 ; setae in this position on tergites III–VIII in an irregular transverse row (Text-fig. 10), but posterior tergites with fewer setae (3) than anterior (8) ; B_1 and B_2 on IX very weakly expanded at apex ; sternites with transverse row of about 24 rather long fine setae (40μ).

Measurements in microns of holotype with one paratype in parentheses. Body length 2200 (1750). Hind tibia 260 (245). Fore wing 850 (700). Head, length 275 (260) ; width 210 (190) ; postocular seta 105 (90). Pronotum, length 130 (125) ; width 320 (300) ; epimeral seta 84 (78). Tergite IX, B_1 155 (155) ; accessory seta 105 (105) ; B_2 160 (160). Tube, length 180 (160) ; terminal setae 160 (145). Antennal segments length 42 (35) ; 52 (49) ; 84 (84) ; 80 (80) ; 100 (97) ; 80 (80) ; 65(65) ; 49 (45) ; terminal seta 60 (60).

Holotype ♀. GUADALCANAL : Forest litter in root mat, 5.vii.1965 (*P.N.L.*).

Other material. GUADALCANAL : near Honiara, Poha River, grasses and weeds, 1 ♀, 19.xi.1965 (*P.N.L.*) ; Mt. Austen, 1 ♀, 21.ix.1965 (*P.J.M.G.*).

Bradythrips hesperus Hood & Williams

Bradythrips hesperus Hood & Williams *in* Hood, 1925 : 68–69.
Bradythrips hesperus Hood & Williams ; Hood & Williams, 1927 : 4–5.
Bradythrips hesperus Hood & Williams ; Ananthakrishnan, 1966 : 5.

Type material of this species has not been studied but the specimens listed below compare closely with the published descriptions. All the specimens from the Solomon Islands however are macropterous, whereas the original specimens from Guyana and the recently collected ones from Quilon in Southern India are all apterous. At the apex of the tube there is a pair of fine dorsal setae which are less than one quarter as long as the four major anal setae, and laterally on the metathorax there is a large seta on a tubercle.

Material studied. GUADALCANAL : Mt. Austen, beaten from dead sticks on ground, 9 ♀, 11.ii.1966, and 2 ♀ with 8 larvae, 8.ii.1966 (*P.J.M.G.*). SAN CRISTOVAL : forest litter, 1 ♀, 5.viii.1965 (*P.N.L.*).

Ecacanthothrips spinipes (Bagnall)

(Text-figs. 5 & 6)

Phloeothrips spinipes Bagnall, 1908 : 195–196.
Ecacanthothrips spinipes (Bagnall) Mound, 1968 : 90.
Ormothrips inermis Buffa, 1909 : 168. **Syn. n.**
Ecacanthothrips bagnalli Priesner, 1930 : 364–365. **Syn. n.**
Ecacanthothrips guineaensis Moulton, 1947 : 176–177. **Syn. n.**

Bagnall described the unique holotype of this species, which was dry on a card point, as having yellow antennae. This specimen has now been mounted into balsam and not only are the distal antennal segments brown but also segments three and four have light brown shadings near their apices. The antennae of *inermis* were also described as being yellow. Buffa's unique holotype has not been studied but the description does not separate it from *spinipes*, and as this species is apparently common in New Guinea, *inermis* is here regarded as a synonym. The unique holotype of *bagnalli*, which is a medium-sized male, and the type series of *guineaensis*, three very small females, have been studied and compared with the material listed below from New Guinea and the Solomon Islands.

This species can be distinguished from *sanguineus* Bagnall, the type-species of the genus, by the unarmed fore femora of the female and the broader reticulations laterally on the pelta (Text-figs. 5–7). The male has two subapical fore femoral teeth, a small and variable dorsal one overlaying the larger ventral tooth (cf. fig. in Priesner, 1930). However the species varies considerably in size, even within a population, and the smallest individuals can appear very different from the larger ones, as is known in *sanguineus*. In large females the fore femur bears a series of stout thorn-like setae on the inner dorsal surface, the fore tibia has about five tubercles on the inner margin, the sense cones on antennal segment three are dark, and the pelta has broad lateral reticulations. Medium-sized females are similar to the large ones, but very small females have no stout setae on the fore femur, no tubercles on the fore tibia, pale sense cones on the antenna, and the lateral margins of the pelta are eroded into small chitinous islets (Text-fig. 5).

There are four other nominal species of *Ecacanthothrips* with unarmed fore femora in the females. Neither *piceae* Ishida nor *inarmatus* Kurosawa from Japan have been studied, although according to the descriptions they are very similar to each other. The unique holotype of *leai* Moulton from Malaya, which is a very small female, has been compared with a rather large female paratype of *coniger* Priesner from Borneo, but because of the size-difference and the poor state of the *leai* holotype, it is not possible to state how these species differ. From *spinipes* they differ in having the third antennal segment brown.

Material studied. Holotype ♀. NEW GUINEA : Dorey (*Wallace*).

NEW GUINEA : Holotype ♀ and 2 ♀ paratypes of *guineaensis*, with 1 ♀, 1 ♂ labelled as *bagnalli* by Moulton, Finschhafen, on bark, 16.iv.1944 (*E. S. Ross*) ; Maffin Bay, on bark, 3 ♀, 1 ♂, ix.1944 (*E. S. Ross*) ; Mt. Lamington, Owen Stanley Range at 1500 feet, 2 ♀ (*C. T. McNamara*), all in Californian Academy of Sciences collection ; north of Wau, Bulolo Gorge at 900 m, bark of fallen log, 12 ♀, 1 ♂, 4 larvae (with *sanguineus*), 4.vi.1968 (*R. Rice* via *F. Bianchi*) ; Aiyura, on grasses at 5400 feet, 1 ♀, 22.ii.1962 (*J. H. Barrett*).

?KEI ISLANDS : Holotype ♂ of *bagnalli*, in Dr. Priesner's collection.

SOLOMON ISLANDS : Guadalcanal, Mt. Austen, under bark, 4 ♀, 2 ♂, 24.xi.1965 (*P.J.M.G.*) ; Tambeluse, in camp kitchen, 1 ♀, 10.xi.1965 (*P.N.L.*).

Euoplothrips crassipes Hood

Euoplothrips crassipes Hood, 1937 : 599–604.

Species of this genus have a stout curved process on the inner margin of the fore femora. These thrips cause the leaves of their host plants to roll along the margins, and the species are recorded from Samoa, Tonga, Solomon Islands, Eastern Australia, New Guinea and India.

Material studied. SOLOMON ISLANDS : Tulagi, Big Florida Island, in rolled-up leaf, 1 ♀ paratype, 18.iii.1936 (*R. A. Lever*).

Haplothrips gowdeyi (Franklin)

Anthothrips gowdeyi Franklin, 1908 : 724.

This species is very widely distributed on flowers in the tropics, including the Pacific islands, and it probably breeds in the flowers of grasses.

Material studied. GUADALCANAL : Kukum Agricultural Station, on grasses and flowers, 2 ♀, 2.xi.1965 (*P.N.L.*).

Haplothrips priesnerianus Bagnall

Haplothrips priesnerianus Bagnall, 1933 : 327–328.
Haplothrips priesnerianus Bagnall ; Mound, 1968 : 114.

This species appears to be widespread on grasses and other Gramineae in the tropics and subtropics. It has been recorded from Sudan, Libya, Pakistan, India, and the Solomon Islands.

Material studied. GUADALCANAL : on rice, 26 ♀, 9 ♂, xi–xii.1965 (*M. McQuillan*) ; Ilu, on ? *Brachiaria mutica*, 11 ♀, 17 and 27.v.1965 (*M. McQuillan*) ; Kukum Agricultural Station, on grasses and flowers, 1 ♀, 1 ♂, 21.xi.1965 (*P.N.L.*) ; Mt. Popanamisiu, 1 ♀, x.1965 (*P.J.M.G.*) ; Mt. Austen, 1 ♂, 24.viii.1965 (*P.J.M.G.*).

Hoplandrothrips flavipes Bagnall

Hoplandrothrips flavipes Bagnall, 1923 : 628–629.
Phloeothrips gracilicornis Priesner, 1927 : 72–73. **Syn. n.**
Phlaeothrips claratibia Moulton, 1937 : 414. **Syn. n.**
Phloeothrips indicus Ramakrishna & Marghabandu, 1939 : 43–44. **Syn. n.**
Phlaeothrips (*Hoplandrothrips*) *flavitibia* Moulton, 1944 : 300–302, regarded as a synonym of *indicus* R. &. M. in Ananthakrishnan, 1964 : 101–104.
Hoplandrothrips flavipes Bagnall ; Mound, 1968 : 120.

The holotype of *gracilicornis* from Nigeria has not been examined but the material listed below under this name was determined by Dr. Priesner. The characters given by Moulton to distinguish the Fijian species *flavitibia* from *flavipes* are not correct, and although the types have not been studied, the synonymy given by Ananthakrishnan is accepted here. Specimens determined by Dr. Ananthakrishnan as *indicus* have been studied but not the unique holotype of that name. Moulton (1947 : 175) has recorded a female of *claratibia* from Finschhafen, New Guinea ; Bianchi (1953 : 106) records both sexes from Samoa, and the species is here recorded for the first time from the Solomon Islands, Sumatra, and Malaya. There is no record of the species from the Neotropics but it is now known from Hawaii to West

Africa. It probably feeds on fungus growing on dead wood and may well have been distributed round the world on the wood stored in ships as firewood. The Indian specimens listed below have fewer accessory wing cilia (6–8) than African or Solomon Islands specimens (10–12), and Moulton states that *flavitibia* has sixteen. The tubercle at the apex of the fore femur is not developed in very small males.

The species is placed in *Hoplandrothrips* rather than *Phlaeothrips* because the fore wings are weakly constricted medially. The antenna with the four fat sense cones on segment three has been figured by Ananthakrishnan, Priesner and Mound, and the following notes are intended to amplify the other descriptions.

Colour brown, median abdominal segments paler ; all tibiae, tarsi and femoral apices yellow, extreme base of mid and hind femora pale ; major pronotal setae dark ; wings weakly shaded, cilia dark ; antennals III, IV, V and sometimes VI shaded apically but much paler in teneral specimens. Head reticulate ; postoculars long, broadly expanded at apex ; vertex with about six pairs of fine submedian setae, cheeks with one pair of stout sub-basal setae ; stylets close in centre of head. Antennal III with four fat sense cones ventrally, IV with four stout sense cones. Pronotum reticulate near posterior margin particularly in large individuals ; pronotal setae long, expanded ; praepectus absent, mesopraesternum absent medially ; female with minute fore tarsal tooth, male with large tooth. Lateral mesonotal setae well developed ; metanotum reticulate. Pelta bell-shaped ; abdominal tergites with two pairs of wing-retaining setae ; tergite IX with B_1 and B_2 more than two thirds as long as tube, weakly expanded at apex ; terminal setae as long as tube.

Material studied. Holotype ♀. [KENYA : Kijalie, Kikuyu Escarpment, xii.1911 (*Alluaud & Jeannel*)] 27.

GUINEA : Conakry, on Kola nuts, 27 ♀, 2 ♂, determined by Priesner as *gracilicornis*, xii.1898 (*Maclaud*).

HAWAIIAN ISLANDS : Oahu, Kipapa, in wind trap, holotype ♂ of *claratibia*, 26.iv.1934, in California Academy of Sciences collection.

INDIA : Madras, on palm leaf sheath, 1 ♀, 23.x.1960 ; on coconut sheath, 1 ♀, 1 ♂, 8.iv.1964 (*Ananthakrishnan*).

SUMATRA : Lampongs, 1 ♀, 25.xi.1921 (*Karny*).

MALAYA : Pahang, on *Palaquium gutta*, 1 ♀, 14.ix.1925 (*Corbett*).

SOLOMON ISLANDS : Kolombangara, 30 m, Pepele, 1 ♀, 1 ♂, 13.ii.1964, and 1 ♀, 11.ii.1964 (*P. Shanahan*), in Bishop Museum collection, Hawaii ; San Cristoval, 7 miles South of Wainoni, in forest leaf-litter, 1 ♀, 26.iv.1965 (*P.N.L.*).

MYSTROTHRIPS Priesner

Mystrothrips Priesner, 1949 : 117, Type-species : *Sagenothrips dammermanni* Priesner, 1933, by monotypy.
Mystrothrips Priesner ; Stannard, 1955 : 92–93.

The following redefinition of this genus is based on a paratype of *dammermanni* from Java and the new species described below. According to Stannard, *clavatoris* Hood from Brazil, the only other species in the genus, has knobbed setae on the antennae and legs. The present author has taken at least one species of this genus in leaf-litter in Queensland, Australia.

Body strongly reticulate, all major setae broadly expanded except on antennae. Head longer than broad, concave at posterior dorsal margin, deeply incut behind eyes ; postocular setae short and expanded ; one pair of postocellar and mid-dorsal setae present ; cheeks tapering slightly to base of head, each with about five fine recurved setae ; maxillary stylets wide apart, retracted about halfway into head ; antennae eight-segmented, segments sculptured, three sense cones on III and IV, terminal seta longer than VIII. Pronotum reticulate, epimeral sutures complete ; anteroangular and midlateral setae about as far apart as the length of one seta ; praepectus very weak but apparently present ; mesopraesternum weakly sculptured, broadly boat-shaped ; fore tarsal claw slender, slightly curved, length equal to half the tarsal width. Mesonotum with lateral setae well developed, broadly expanded. Median setae of metanotum slender ; three pairs of basal wing setae with expanded apices. Pelta broad, reticulate, withdrawn into concave anterior margin of tergite II. Tergites II–VII with two pairs of sigmoid wing-retaining setae ; B_1 and B_2 on IX long with broad round apices, B_3 acute ; tube faintly sculptured with overlapping scales, terminal setae shorter than tube ; sternites with a row of about twelve accessory setae, marginal seta B_1 shorter than B_2.

Mystrothrips dilatus sp. n.

(Text-figs. 11 & 12)

♀ (micropterous). Colour yellowish, shaded brown on tergite II, at sides of head, apex of tube, and antennal segments I, II, VI–VIII and apical half of V. Head very similar to *dammermanni* (see fig. in Stannard, 1955 : 101); postocellar setae fan-shaped, little smaller than postoculars ; sensorium on antennal II near apex (Text-fig. 11). Tergites and sternites fully sculptured (Text-fig. 12) ; tube with faint sculpture, like overlapping scales.

Measurements in microns of holotype. Body length 1900. Hind tibia 160. Fore wing 180. Head, length 210 ; width 160 ; postocular seta 20. Pronotum, length 110 ; width 270 ; epimeral seta 20 long, 13 wide at apex. Tergite IX, B_1 110 ; B_2 130. Tube, length 135 ; terminal setae 80. Antennal segments : 42 ; 50 ; 70 ; 68 ; 68 ; 58 ; 42 ; 42.

Holotype ♀. KOLOMBANGARA : near Kuzi, 1500 ft., leaf-litter in mossy wood, 4.ix.1965 (*P.N.L.*).

Although this new species resembles *dammermanni* not only in the characters given in the generic definition but also in the colour pattern, it can be distinguished by the shorter, more broadly expanded, fan-shaped setae particularly on the head and pronotum. In *dammermanni* the postocellar setae are small with acute apices and the prothoracic epimeral setae about three times as long as broad apically.

PSALIDOTHRIPS Priesner

Psalidothrips Priesner, 1932 : 61–62. Type-species : *P. amens* Priesner, by monotypy.

This genus was erected for the species *amens* from Java, which was based on a single female, and the author is grateful to Dr. Priesner for the loan of this holotype. The following definition of the genus is based on a comparison of *amens* with the two new species from the Solomon Islands described below, but the other four species in *Psalidothrips*, described by Hood (1955) from Belem, Brazil, have not been studied.

Slender, weakly sclerotized, bicoloured thrips. Head as broad as long, cheeks rounded, narrowed to base, eyes well developed ; ventral surface with only one pair of long setae, arising between tentorial pits not at base of head ; postocular setae long, close to eye, postocellars about as long as ocellar traingle ; maxillary stylets not deeply retracted into head, without maxillary bridge ; maxillary palps very small, scarcely longer than labial palps ; mouth cone short and rounded. Antennae eight-segmented ; sensorium on II near apex. Pronotum with anteromarginal and anteroangular setae minute, posteroangulars about twice as long as epimerals ; epimeral sutures complete ; mesopraesternum complete, praepectus absent with cuticular islets arranged linearly in a regular pattern. Meso- and metanotum faintly sculptured, without major setae ; ventral thoracic setae minute. Fore femora thickened in both sexes, fore tarsus unarmed in female, with stout tooth in male. Fore wing cilia widely spaced, distal half of wing parallel-sided without accessory cilia ; two pairs of small sub-basal wing setae, B_1 minute. Pelta not constant in shape, margin frequently broken up into cuticular islets. Tergites II–VII with two pairs of wing-retaining setae, these setae curved but not sigmoid ; B_1 and B_2 on IX almost as long as tube in both sexes ; terminal setae shorter than tube ; fustis of female short and weak. Sternal accessory setae less than 10μ long, each sternite with less than six accessory setae ; sternite VIII of male with transverse glandular area ; sternite VI of male frequently with a pair of deeply reticulate areas.

Priesner originally placed this genus in the Haplothripini near to *Adraneothrips*. However the wing form of *Psalidothrips* is probably an adaptation to the leaf-litter habitat. The genus has subsequently been placed in both the Phlaeothripina and Mesothripina, but it is probably related to *Sagenothrips*, another Melanesian leaf-litter form, and should come into the Hoplothripina. Most Phlaeothripidae have a pair of long setae near the posterior ventral margin of the head, but in *Psalidothrips* these setae are short and there is a pair of long setae between the tentorial pits. The genus is also unusual in the small size of the maxillary palps and the anterior setae of the pronotum, as well as the few sternal accessory setae.

The three species in this genus known to the author may be distinguished by means of the following key. Unlike many fungus-feeding species of thrips, the two new species are remarkably constant in body size and the lengths of their major setae.

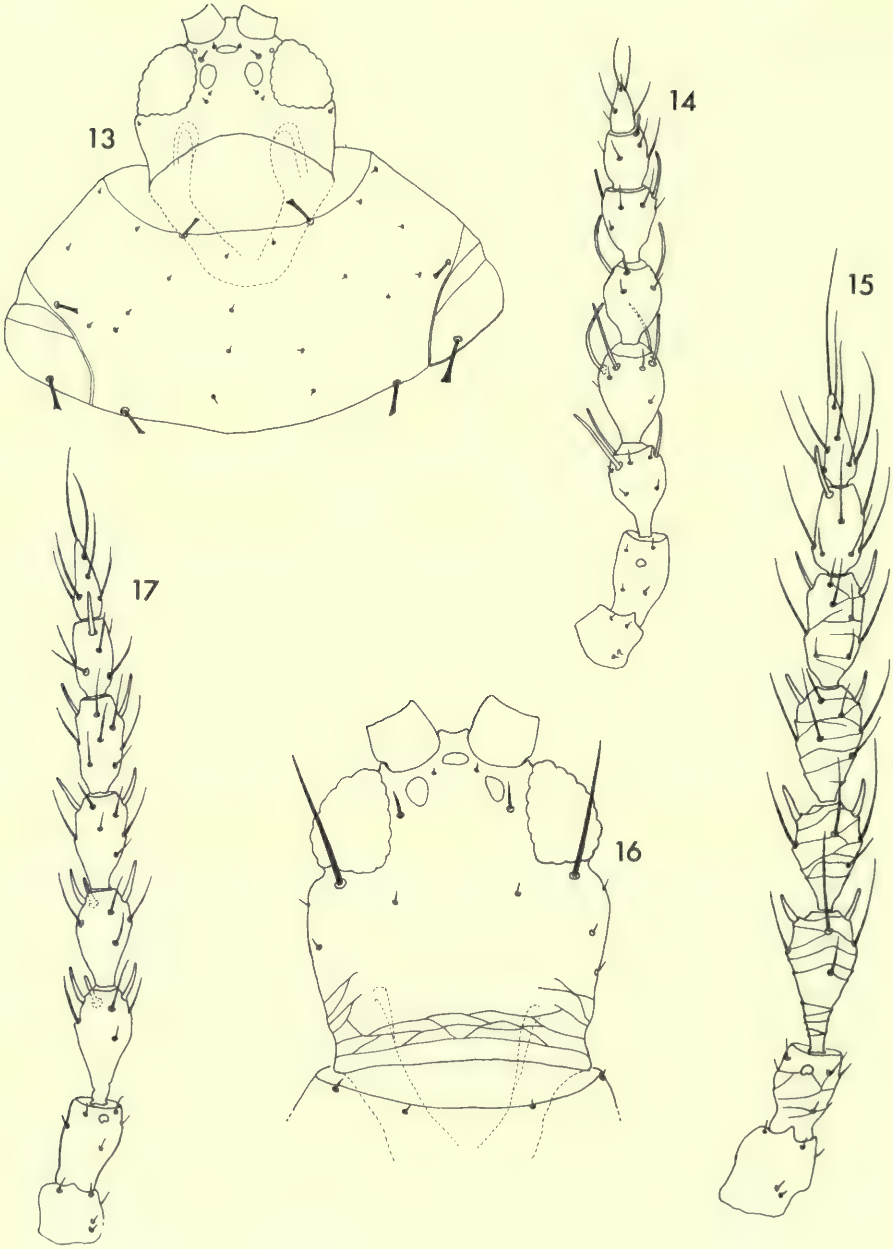
1 Antennal segments with lines of sculpture ; segments III and IV with two sense cones ; maxillary stylets subparallel, retracted about half way into head ; head, antennae, mesothorax and abdominal segment II brown, rest of body yellowish, male micropterous . . . . **grandis** sp. n. (p. 103)

– Antennal segments without sculpture ; III and IV with three sense cones, the ventral one smaller than the lateral ones ; maxillary stylets wide apart, V-shaped low in head ; abdominal segments shaded laterally, II not distinctly browner than other segments 2

2 Sense cones on antennal IV about two thirds as long as segment ; postocular and epimeral setae with apices expanded ; head brown ; male not known **amens** Priesner

– Antennal sense cones shorter, on IV about one half as long as segment ; major setae acute or softly rounded at apex ; head pale medially, deeply shaded between eyes and along cheeks ; male macropterous . . . . . **minor** sp. n. (p. 103)

According to the descriptions given by Hood (1955) the four species from Brazil may be distinguished as follows ; *dissidens* and *umbraticus* have three sense cones on antennal III and four on IV, and *dissidens* is almost uniformly brown ; *retifer* has three sense cones on both III and IV but the head is reticulate all over ; *conciliatus* has two sense cones on III and IV as in *grandis* but the segments are apparently not reticulate and the sense cones are more than half as long as the segments.



Figs. 13–17. Figs. 13 & 14. *Sophikothrips malaitae :* 13, Head and pronotum. 14, Left antenna. Figs. 15 & 16. *Psalidothrips grandis :* 15, Left antenna. 16, Head. Fig. 17. *Psalidothrips minor*, left antenna.

***Psalidothrips grandis* sp. n.**

(Text-figs. 15 & 16)

♀ (macropterous). Colour yellow ; head, abdominal tergite II, anterolateral sclerites of mesothorax, and antennal segments brown, base of antennal III and distal half of II paler ; head sometimes pale at base ; mid and hind coxae, and sides of tube shaded ; fore wings shaded except at median constriction.

Head weakly sculptured at base (Text-fig. 16), ventral surface smooth ; antennal segments sculptured, lateral sense cones on III 13–16μ, ventral sense cone not developed (Text-fig. 15). Anteroangular and anteromarginal setae of pronotum 6μ long ; midlateral seta 50μ, epimeral 30μ, posteroangular 70–90μ. Median setae of metanotum weak, less than 15μ long, about 40μ apart. Basal wing setae small, B_1, 6μ, B_2 and B_3 15–30μ. Pelta broadly bell-shaped ; tergites very faintly sculptured ; tube rather strongly narrowed, about 130μ long, 70μ wide at base, 25μ at apex.

Measurements in microns of holotype with range from five paratypes in parentheses. Body length 1850 (1750–1900). Hind tibia 195 (180–200). Fore wing 830 (730–900). Head, length 210 (195–) ; width 195 (180–). Pronotum, length 155 (145–160) ; width 260 (240–). Tergite IX, B_1 135 (125–) ; B_2 165 (145–). Tube length 130 (125–140). Antennal segments length 39 (–42) ; 39 (–42) ; 65 (–68) ; 52 (45–55) ; 52 (49–55) ; 55 (52–) ; 49 (45–52) ; 49 (45–52) ; terminal seta 70.

♂ (micropterous). Colour and chaetotaxy similar to female ; fore femora thicker than female, fore tarsal tooth more than two thirds as long as width of tarsus. Glandular area on abdominal sternite VIII 30μ long extending across full width of sternite ; sternite VI with paired submedian areas of deeper reticulation sometimes present.

Measurements in microns of allotype. Body length 1500. Hind tibia 175. Fore wing 210. Head, length 190 ; width 160. Pronotum, length 155 ; width 230. Tergite IX, B_1 120 ; B_2 80. Tube length 100. Antennal segments 35 ; 35 ; 58 ; 45 ; 52 ; 52 ; 45 ; 45 ; terminal seta 60.

Holotype ♀. KOLOMBANGARA : North of Kuzi at 1000 feet, 6.ix.1965 (*P.N.L.*). Allotype ♂, 12 ♀ and 7 ♂ paratypes taken with holotype.

Other material. KOLOMBANGARA : North of Kuzi at 250 feet, 12 ♀, 4 ♂ and 1 larva, 6.ix.1965 (*P.N.L.*). GUADALCANAL : Nuhu at 1000 feet, 1 ♀, 28.x.1965 (*P.N.L.*). VANGUNU : 1 ♀, 10.vi.1966 (*P.J.M.G.*).

Although the females of this species are macropterous, many specimens had the distal half of the fore wings broken. This condition was so common that it is possible the wings are broken naturally in the field.

In the larva the anterior margin of the pronotum bears very small setae as in the adult.

***Psalidothrips minor* sp. n.**

(Text-fig. 17)

♀ (macropterous). Colour pale yellowish brown ; dark brown at anterior and lateral margins of head, and anterior and lateral margins of pterothorax ; antennae shaded brown, also anterior corners of abdominal tergites ; wings shaded except at median constriction, cilia dark.

Head almost without sculpture, very similar to *grandis* ; surface of antennal segments smooth (Text-fig. 17), ventral sense cone on III and IV about 10μ long. Midlateral seta of pronotum weakly expanded, all other major setae acute or softly rounded at apex. Tergal sculpture weaker than in *grandis* ; tube less conical, about 115μ long, 60μ wide at base, 25μ at apex.

Measurements in microns of holotype with range from five paratypes in parentheses. Body length 1750 (1550–1800). Hind tibia 175 (170–). Fore wing 730 (700–750). Head, length 170 (–180); width 165 (–175). Pronotum, length 135 (130–140); width 225 (210–230). Tergite IX, B_1 100 (–115); B_2 140 (130–). Tube length 115 (110–). Antennal segments length 30 (–32); 40; 58 (54–); 52 (45–); 49 (45–); 49 (45–52); 39 (42–); 42 (39–); terminal seta 50.

♂ (macropterous). Colour and chaetotaxy similar to female; fore femora thickened, fore tarsal tooth about two thirds as long as tarsal width. Glandular area on sternite VIII about 15µ long, extending fully across width of sternite; sternite VI with a pair of submedian deeply reticulate areas; B_2 on tergite IX much stouter than B_1 at base.

Measurements in microns of allotype. Body length 1600. Hind tibia 175. Fore wing 700. Head, length 165; width 140. Pronotum, length 130; width 210. Tergite IX, B_1 100; B_2 90. Tube length 100. Antennal segments 26; 35; 55; 45; 49; 49; 35; 39; terminal seta 42.

Holotype ♀. GUADALCANAL: Mt. Austen, 21.iv.1965 (*P.J.M.G.*).

Allotype ♂ collected with holotype.

Other material. GUADALCANAL: Mt. Austen, 1 ♀, 8.ii.1966 (*P.J.M.G.*); Nuhu at 1000 feet, 1 ♀, 1 ♂, 28.x.1965 (*P.N.L.*). KOLOMBANGARA: ? locality, 3 ♀, 3 ♂, 9.vi.1965 (*P.J.M.G.*); North of Kuzi at 500 feet, in forest leaf-litter, 1 ♂, 6.ix.1965 (*P.N.L.*). WAGINNA: 11 ♀, 10 ♂ and 1 larva, 3.vii.1966 (*P.J.M.G.*). CHOISEUL: Malangona, 1 ♀, 8.iii.1964 (*P. Shanahan*) in Bishop Museum Collection.

This species is more closely related to *amens* Priesner, the type-species of the genus from Java, than to *grandis* with which it was collected at one site in the Solomon Islands.

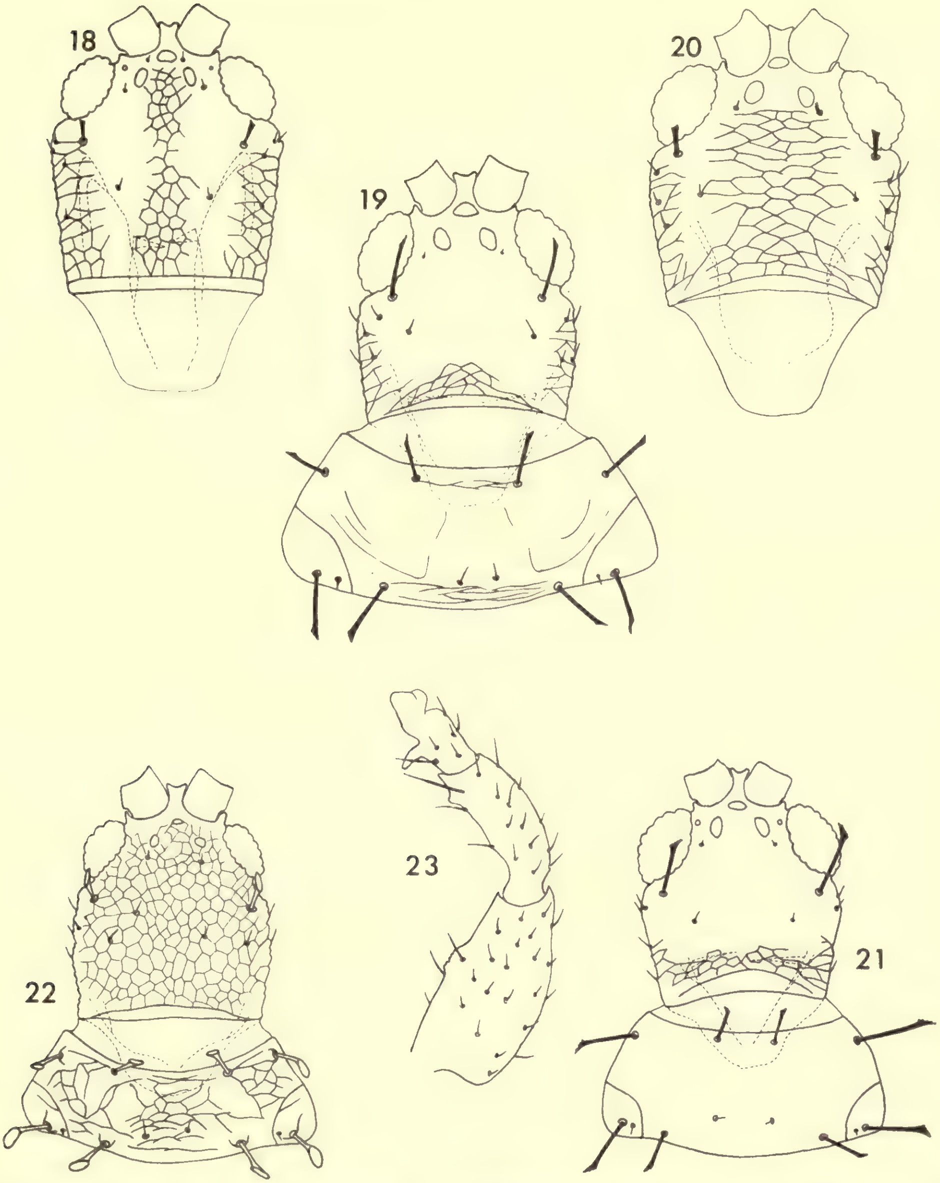
SOLOMONTHRIPS gen. n.

Type-species: *Solomonthrips greensladei* sp. n.

Small slender species, light brown or frequently yellowish with brown markings, metanotum and at least part of head reticulate. Usually macropterous but micropterous and hemimacropterous individuals found. Antennae eight-segmented, almost moniliform, VIII always distinct, usually constricted at base; two sense cones ventrolaterally on III and IV, sensorium on II near apex; apical seta on VIII very long, usually longer than VII + VIII. Eyes well developed, cheeks sharply incut behind eyes without major setae; vertex reticulate at least in part, postocular setae well developed; mouth cone short and rounded apically, maxillary palps small; stylets deeply or barely retracted into head, usually with maxillary bridge.

Pronotum transverse, weakly sculptured, epimeral sutures complete; only four pairs of major setae present, anteroangulars (? or midlaterals) absent, posteroangulars not close to epimeral sutures; major setae broadly expanded apically. Mesonotum reticulate, without major or elongate setae. Metanotum with elongate triangular band of reticulation, median setae not enlarged. Praepectus present, sometimes weak; probasisternum large and pigmented; mesopraesternum not small but weakly sclerotized. Fore femora moderately enlarged, sometimes with indistinct irregular hump on inner margin; fore tibiae unarmed in female; fore tarsi armed in both sexes. Fore wings weakly expanded at base, distal two thirds slender and parallel-sided; cilia widely separated except around apex, no duplicated cilia; third sub-basal wing seta distant from one and two.

Pelta reticulate, bell-shaped; tergites III to VIII with two pairs of wing-retaining setae, only one wing-retaining seta on tergite II; tergites laterally frequently with sculpture. Setae on tergite IX shorter than tube, B_1 and B_2 expanded apically; terminal cilia of tube short



Figs. 18–23. Figs. 18–22. Heads of *Solomonthrips* species: 18, *intermedius*. 19, *greensladei*. 20, *striatus*. 21, *fimbrii*. 22, *setifer*. Fig. 23. Fore leg of *S. greensladei* male.

and weak. Male without glands on sternites; B_2 on tergite IX not reduced to a stout seta, little different from B_2 of the female.

Although superficially resembling both *Malacothrips* and *Adraneothrips*, this new genus can be distinguished from them both by the presence of the praepectus. *Mystrothrips* is also similar but has three sense cones on the third and fourth antennal segments, and has the lateral mesonotal setae well developed. The thoracic chaetotaxy of *Solomonthrips* is unique and moreover the development of wing-retaining setae on the eighth tergite is unusual. However the genus is probably derived from a genus like *Sagenothrips*. The author has examined the unique holotype of *Sagenothrips gracilicornis* through the courtesy of Dr. Priesner, and this specimen has no major mesonotal setae and the third sub-basal wing seta is more than twice its length from the second. The pronotal anteroangular and midlateral setae are very reduced, less than 10μ long. Contrary to Stannard (1955 : 79) the anteromarginal setae are present, 16μ long, the right hand one being displaced submarginally and the left hand one partially obscured by the pigment of this imperfectly cleared individual. Although the heads of both genera are more or less reticulate, neither *Sagenothrips* nor *Solomonthrips* belong in the Glyptothripini. The reticulation of the body and the weak structure of the wings are probably functional adaptations to the leaf-litter habitat.

KEY TO THE SPECIES OF *SOLOMONTHRIPS*

1 Tergite VIII with B_1 not large and expanded as on tergite VII but acute and curved, closely parallel to marginal wing-retaining setae (Text-fig. 24) ; fore femur in both sexes with irregular hump on inner margin (Text-fig. 23) ; major males with subapical fore tibial spur (male not known in *striatus*) ; two pairs of long ventral interocular setae, as long as antennal III 2

– Tergite VIII with chaetotaxy closely similar to tergite VII, B_1 major straight with expanded apex (Text-fig. 25) ; fore femur without an irregular hump on inner margin, male without a subapical fore tibial spur ; ventral interocular setae not as long as antennal III although sometimes longer than remaining ventral head setae 3

2 Sternal reticulations on V–VII anterior to median row of accessory setae with internal longitudinal striations (Text-fig. 30) ; median area of vertex between postocular setae clearly reticulate (Text-fig. 20) ; antennal III much paler than IV, head without median longitudinal dark stripe . . . . . . ***striatus*** sp. n. (p. 113)

– Sternal reticulations without internal longitudinal striations ; median area of vertex between postocular setae without sculpture or with very faint reticulations (Text-fig. 19) ; antennal III not much paler than IV, head usually with median longitudinal dark stripe . . . . ***greensladei*** sp. n. (p. 107)

3 Antennals III and IV with dorsal setae expanded apically (Text-fig. 27) ; head fully reticulate both dorsally and ventrally (Text-fig. 22) ; ventral interocular setae no longer than remaining ventral head setae ; probasisternum fused into single plate ; abdominal sternites with more than twelve long accessory setae ; major body setae very broadly expanded, lateral abdominals almost as broad as long ; maxillary stylets barely retracted into head, maxillary bridge absent . ***setifer*** sp. n. (p. 111)

– Antennal segments with major setae acute ; head not fully reticulate ; ventral interocular setae longer than remaining ventral head setae ; probasisternal plates separate ; abdominal sternites with accessory setae small, less than a quarter as long as sternal marginals ; lateral abdominal setae longer than width of apical expansion 4

4 Upper surface of head with median longitudinal band of reticulation (Text-fig. 18) ; stylets deeply retracted into head, maxillary bridge about one third of head

width ; major setae short with expanded smooth apex, basal wing setae less than half basal width of fore wing ; tergite IX setae B_1 rather short, two thirds of B_2. **intermedius** sp. n. (p. 110)

– Upper surface of head not sculptured between postocular setae but with transverse band of reticulations at base (Text-fig. 21) ; stylets low in head, maxillary bridge more than half of head width ; major setae long, expanded apices fimbriate, basal wing setae more than half basal width of fore wing ; tergite IX setae B_1 more than two thirds as long as B_2 . . . . **fimbrii** sp. n. (p. 110)

The development of the major seta B_1 on tergite eight as an additional wing-retaining seta in *greensladei* and *striatus* is not always complete. Although weak and sigmoidal in all the specimens studied, this seta in a few individuals is very weakly expanded or " soft " at the apex instead of acute. The characters given in the key suggest that *setifer* is quite distinct from the other species, but it appears to be merely an extreme specialization within the group. The probasisternal plates are large and heavily pigmented in the other species and so their fusion in *setifer* is not particularly surprising. Similarly the placement of the maxillary stylets and the extent of the reticulation on the vertex is variable between the other species and the condition in *setifer* can be regarded conveniently as an extreme of a series.

Solomonthrips greensladei sp. n.

(Text-figs. 19, 23, 24, 26, 34, 35)

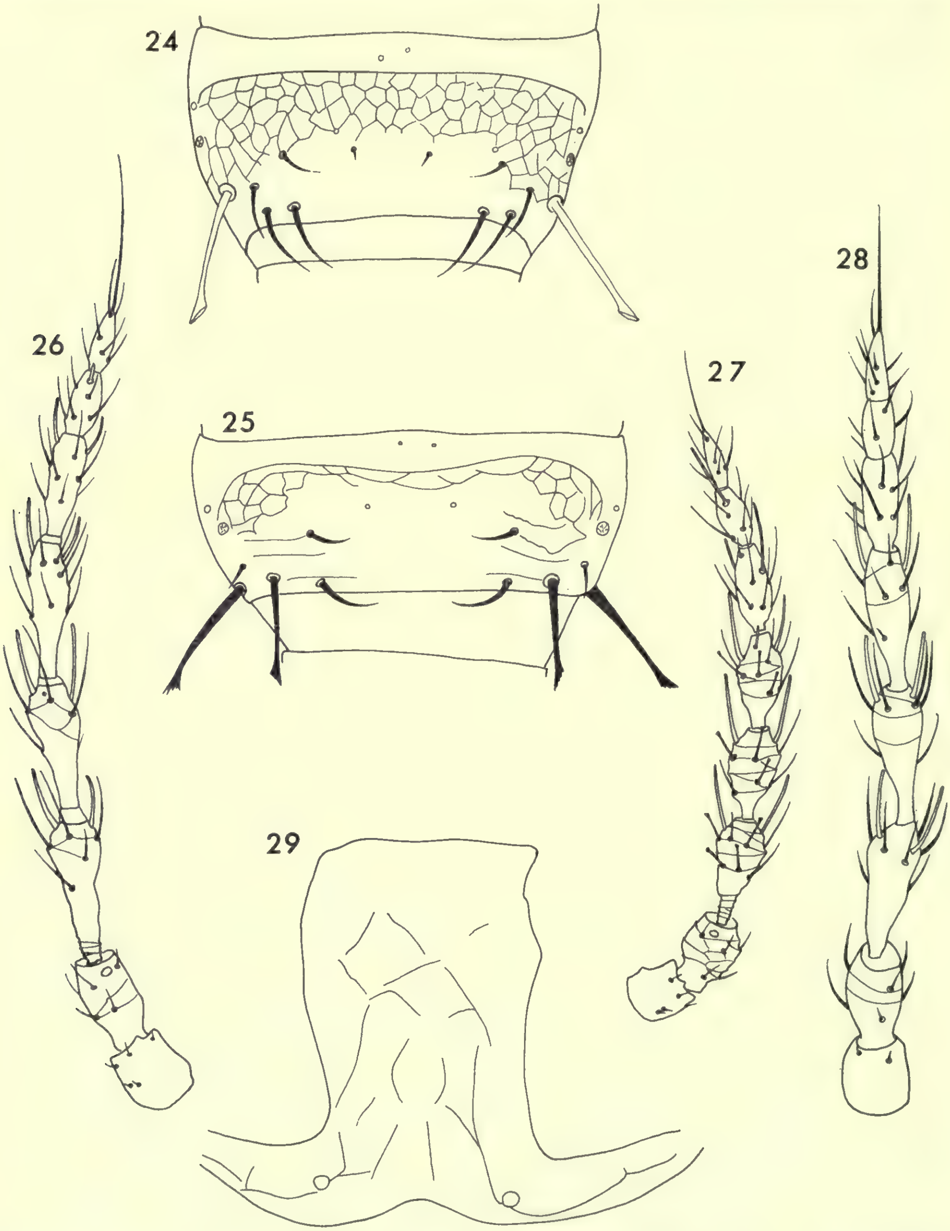
The specimens on which this species is described are variable both in colour and the lengths of some major setae. These specimens were collected at several different sites in the Solomon Islands and although the two main colour forms were collected together on both Guadalcanal and Kolambangara there is a possibility that local populations may eventually be found to be specifically distinct. For this reason a male has been selected as holotype, and this individual is weakly oedymerous and has the aedeagus exposed (Text-fig. 35).

♂ (macropterous). Colour yellowish, thoracic sternites and coxae brown, head with lateral margins and median longitudinal stripe brown ; antennae light brown, darkening distally ; fore and hind wings and major setae shaded ; mid and hind tarsi yellow, rest of legs variable pale brown ; abdominal segments weakly shaded posterolaterally, tube darker apically.

Head reticulate at base, weakly sculptured medially (Text-fig. 19) ; maxillary stylets low ; antennals III, IV and V with two ventrolateral sense cones, a small dorsal sense cone on V (Text-fig. 26). Pronotum wider than long, weakly scupltured medially (Text-fig. 19), epimeral sutures complete. Fore femora weakly incrassate, interior margin with indistinct rugose hump, fore tibia with apex thickened or with a spur in major males, fore tarsus with stout claw (Text-fig. 23). Mesonotum reticulate near posterior margin, without long or expanded setae. Metanotum reticulate medially with one pair of weak setae near anterior margin. Fore wing typical of genus.

Pelta longer than wide, weakly reticulate (Text-fig. 34) ; tergites III–VIII with two pairs of wing-retaining setae, the posterior pair much stouter than the anterior pair on anterior segments ; major seta B_1 on tergite VIII fine and curved, usually with acute apex, parallel to wing-retaining setae (Text-fig. 24) ; B_1 on tergites II–VII with broadly expanded assymetric apex, sculpture anterior to B_1 with stout dentate microtrichia, tergites weakly reticulate medially ; B_1 on IX shorter than or sub-equal to B_2 with moderately expanded apex, B_2

acute ; tube with faint sculpture like overlapping tiles, terminal setae shorter than tube. Sternites transversely reticulate anterior to accessory setae, reticules sometimes with one or



Figs. 24–29. *Solomonthrips* species. Figs. 24 & 25. Tergite VIII : 24, *greensladei*. 25, *fimbrii*. Figs. 26–28. Antennae : 26, *greensladei*. 27, *setifer*. 28, *fimbrii*. Fig. 29. Pelta of *fimbrii*.

two faint longitudinal markings ; median sternal setae arise submarginally, about three times as long as accessory setae.

Measurements in microns of holotype with range from three paratypes in parentheses. Body length 1370 (1130–1500). Hind tibia 120 (105–145). Fore wing 570 (480–700). Head, length 150 (130–175) ; width 140 (125–170) ; postocular seta 45 (39–65). Pronotum, length 97 (74–105) ; width 240 (190–255) ; epimeral seta 32 (–65). Tergite IX, B_1 72 (65–95) ; B_2 90 (80–110). Tube, length 97 (80–110) ; terminal setae 60 (50–80). Antennal segments length 32 (29–32) ; 39 (–45) ; 68 (58–75) ; 55 (48–68) ; 61 (55–71) ; 50 (45–) ; 32 (29–) ; 32 (29–) ; terminal seta 65 (58–97).

♀ (macropterous). Colour similar to male, but abdomen typically with sternite V as dark as thoracic sternites ; several females have abdomen brownish yellow, as in typical males without a dark band on segment V ; antennae variable, usually with apex of III not much paler than IV. Chaetotaxy and sculpture of female very similar to male, fore tibiae not armed.

Measurements in microns of allotype with range from four paratypes in parentheses. Body length 1650 (1400–1780). Hind tibia 175 (145–180). Fore wing 720 (570–). Head, length 160 (145–180) ; width 155 (145–170) ; postocular seta 45 (38–49). Pronotum, length 105 (80–120) ; width 225 (205–250) ; epimeral seta 35 (32–42). Tergite IX, B_1 110 (84–) ; B_2 115 (97–). Tube, length 120 (105–125) ; terminal setae 70 (58–74). Antennal segments length 39 (29–) ; 45 (39–) ; 77 (68–) ; 74 (64–) ; 58 (52–) ; 39 (35–43) ; 35 (32–39) ; terminal seta 90 (80).

Holotype ♂. GUADALCANAL : Mt. Gallego at 2500 feet, 12.vii.1965 (*P.N.L.*).

Allotype ♀ and paratype ♂ taken with holotype.

Other material. GUADALCANAL : Umasani River, forest litter, 2 ♀, 1 ♂, 5.vii.1965 (*P.N.L.*) ; Nuhu, 1 ♂, 31.x.1965 (*P.N.L.*) ; Mt. Austen, forest litter, 1 ♀, 19.xi.1963 (*P.J.M.G.*) ; Mt. Austen, beaten from sticks on ground, 5 ♀ and 1 larva, 11.ii.1966 (*P.J.M.G.*) ; Mt. Popanamisiu, montane forest litter at 5000 feet, 1 ♂, x.1965 (*P.J.M.G.*) ; Malekuna, forest soil, 1 ♂ ,9.iv.1966 (*P.J.M.G.*). MALAITA : Puamawara, forest soil, 1 ♂, 11.vii.1966 (*P.J.M.G.*). NEW GEORGIA : Canonygu, forest litter, 1 ♀, 18.iv.1966 (*P.J.M.G.*) ; Barakoma, forest litter near airstrip, 1 ♀, 6.v.1966 (*P.J.M.G.*). RENDOVA : 1 ♀, 6.v.1966 (*P.J.M.G.*). GIZO : 1 ♀, 1 ♂, 11.ix.1965 (*P.N.L.*). KOLOMBANGARA : near Kuzi ; forest litter on coral limestone, 2 ♀, 8.ix.1965 (*P.N.L.*) ; litter in mossy wood at 1500 feet, 1 ♀, 4.ix.1965 (*P.N.L.*) ; valley litter at 50 feet, 8.ix.1965 (*P.N.L.*) ; forest litter at 1000 feet, 1 ♀, 1 ♂ and 3 larvae, 6.ix.1965 (*P.N.L.*).

The following material was mounted from tubes in the Bishop Museum, Hawaii. CHOISEUL : Kitipi River at 80 m, 9 ♀, 5 ♂ and 7 larvae, 20.iii.1964, and Malangona, 1 ♂, 4.iii.1964 (*P. Shanahan*). KOLOMBANGARA : Pepele at 30 m, 1 ♂, 1 ♀, 11.ii.1964, and 1 ♀, 13.ii.1964 (*P. Shanahan*) ; Iriri at 5 m, 2 ♀, 1 ♂, 4.vii.1964 (*J. Sedlacek*). MALAITA : Dala at 30 m, 1 ♂ and 2 larvae, 14.vi.1964 (*J. Sedlaceck*). GUADALCANAL : Gold Ridge at 500 m, 1 ♀, 24.vi.1956 (*J. L. Gressitt*).

Larvae taken with this species have four tubercles (or two bifid tubercles) on the head just underneath the antennae. Larvae taken with *striatus* have similar tubercles but the *greensladei* larvae have a smooth head and pronotal shield, and abdominal segment nine is brown only in the distal half.

Solomonthrips fimbrii sp. n.

(Text-figs. 21, 25, 28 & 29)

♂ (macropterous). Colour light brown, antennals I and II and bases of III and IV yellowish ; mid and hind tarsi and median half of tube pale ; fore wings uniformly shaded.

Head reticulate basally (Text-fig. 21), maxillary stylets low in head ; postocular and other major setae with expanded fringed apices ; antennae shorter than in *greensladei* (Text-fig. 28)

Pronotum similar to *greensladei* but epimeral and midlateral setae twice as long as anteromarginals and posteroangulars ; praepectus and mesopraesternum weak ; fore femora without a tubercle, fore tarsi with a stout claw. Mesonotum as in *greensladei*, metanotum broadly reticulate in median area. Fore wings typical of genus, sub-basal setae rather long.

Pelta with basal portion rather broad (Text-fig. 29) ; tergite VIII with two pairs of wing-retaining setae, B_1 broadly expanded apically (Text-fig. 25). Tergal sculpture rather weak, sternites without reticulations.

Measurements in microns of holotype with one paratype in parentheses. Body length 1150 (900). Hind tibia 130 (115). Fore wing 500 (450). Head, length 135 (125) ; width 125 (120) ; postocular seta 48 (39). Pronotum, length 84 (?) ; width 175 (160) ; epimeral seta 45 (35). Tergite IX, B_1 45 (52) ; B_2 60 (58). Tube, length 87 (72) ; terminal seta 39 (35). Antennal segments length, 19 (23) ; 32 (32) ; 58 (52) ; 55 (48) ; 55 (48) ; 48 (42) ; 35 (26) ; 32 (29) ; terminal seta 64 (58).

♀ (macropterous). Colour of allotype and ♀ from San Cristoval similar to but darker than holotype ; 2 ♀ from Guadalcanal dark brown with brown tube. Sculpture and chaetotaxy very similar to male, pronotum more clearly sculptured than in *greensladei*.

Measurements in microns of allotype with one paratype in parentheses. Body length 1350 (1300). Hind tibia 140 (140). Fore wing 570 (550). Head, length 130 (130) ; width 130 (130) ; postocular seta 49 (49). Pronotum, length 80 (80) ; width 195 (195) ; epimeral seta 45 (45). Tergite IX, B_1 71 (71) ; B_2 77 (77). Tube, length 97 (97) ; terminal seta 48 (48). Antennal segments length 26 (26) ; 35 (35) ; 61 (61) ; 58 (55) ; 55 (55) ; 48 (45) ; 32 (29) ; 35 (32) ; terminal seta 72 (64).

Holotype ♂. GUADALCANAL : Mt. Austen, forest litter, 21.iv.1965 (*P.J.M.G.*).

Allotype ♀ with same data as holotype.

Other material. GUADALCANAL : Mt. Austen, forest litter, 2 ♀, 8.ii.1966 (*P.J.M.G.*) ; litter in river forest hollow, 1 ♂, 5.vii.1965 (*P.N.L.*). SAN CRISTOVAL : near Wainoni, litter on ridge at 1000 feet, 1 ♀, 8.viii.1965 (*P.N.L.*). CHOISEUL : Kitipi River, 1 ♀, 2 ♂, 20.iii.1964 (*P. Shanahan*) in Bishop Museum Collection.

The two dark brown females with the unicolorous brown tube referred to above do not appear to differ in structure from the other specimens although the colour difference is quite distinctive. The extent of the sculptured band near the posterior margin of the vertex is not identical in any of the specimens.

Solomonthrips intermedius sp. n.

(Text-fig. 18)

♂ (macropterous). Colour brown, antennals II and III, hind tarsi, and median area of tergites yellow, also a pale longitudinal stripe behind each eye on vertex ; fore wings shaded.

Head reticulate with a pale unsculptured longitudinal stripe behind each eye (Text-fig. 18) ; maxillary stylets retracted almost as far as eyes ; antennae slender, sense cones lateral on III and IV. Pronotum irregularly sculptured, major setae short ; fore tarsal claw recurved but small ; meso- and metanotum similar to *greensladei* ; B_3 on fore wing more than five times its length from B_2. Pelta stout basally as in *fimbrii* ; abdominal tergites reticulate anteromedially, with dentate microtrichia laterally ; tergite VIII with two pairs of wing-retaining setae, B_1 with moderately expanded rounded apex as other major setae. Sternal accessory setae very small, less than one fifth as long as sternal marginals.

Measurements in microns of holotype. Body length 1250. Hind tibia 130. Fore wing 570. Head, length 160 ; width 135 ; postocular seta 17. Pronotum, length 74 ; width 190 ; epimeral seta 22. Tergite IX, B_1 45 ; B_2 65. Tube, length 105 ; terminal setae 55. Antennal segments length 26 ; 35 ; 64 ; 64 ; 64 ; 48 ; 29 ; 32 ; terminal seta 85.

♀ (macropterous). Rather paler than male but sculpture and chaetotaxy very similar.

Measurements of allotype. Body length 1400. Hind tibia 145. Fore wing 610. Head, length 160 ; width 145 ; postocular seta 17. Pronotum, length 71 ; width 210 ; epimeral seta 26. Tergite IX, B_1 45 ; B_2 71. Tube, length 110 ; terminal setae 52. Antennal segments length 29 ; 32 ; 68 ; 64 ; 64 ; 55 ; 26 ; 29 ; terminal seta 87.

Holotype ♂. GUADALCANAL : Mt. Popanamisiu, montane litter at 5000 feet, x.1965 (*P.J.M.G.*).

Allotype ♀ with same data as holotype.

Solomonthrips setifer **sp. n.**

(Text-figs. 22, 27, 32 & 33)

♂ (micropterous). Colour light brown, femora, tibiae, tube and lateral margins of head darker ; base of antennal III yellow, and a yellow longitudinal stripe behind each eye.

Head fully reticulate (Text-fig. 22), ventral head setae all subequal ; maxillary stylets barely retracted into head, bridge not visible ; antennae rather short, dorsal setae on III, IV and V blunt or expanded (Text-fig. 27).

Pronotum sculptured (Text-fig. 22), probasisternal plates fused medially ; fore tarsal claw slender as in *intermedius*. Mesonotum as in *greensladei* ; metanotum short, fore wings very short but with three basal setae ; mesosternum with about 12 pairs of setae, metasternum with about 24 pairs of setae.

Pelta rather broad, probably foreshortened as a result of microptery (Text-fig. 33) ; tergites with sculpture well developed, lateral setae very short and broadly expanded (Text-fig. 32) ; tergite VIII with two pairs of wing-retaining setae, B_1 short with broadly expanded apex ; tergite IX with B_1 probably expanded and assymetric at apex ; seta between B_1 and B_2 more than half as long as B_1. Sternites transversely reticulate over whole area posterior to antecostal ridge, with about twelve accessory setae each about equal in length to sternal marginal setae.

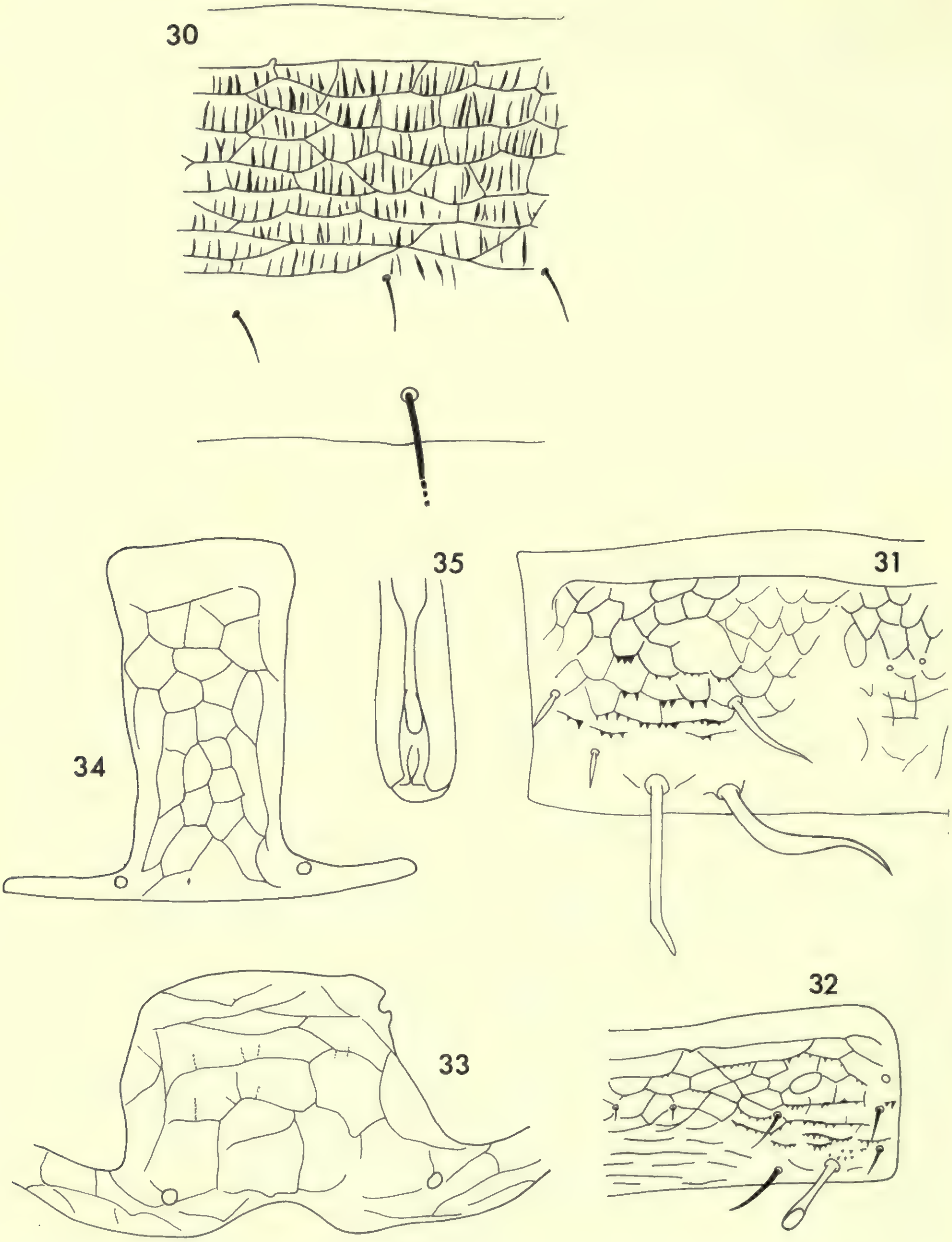
Measurements in microns of holotype. Body length 1050. Hind tibia 120. Fore wing 115. Head, length 145 ; width 125 ; postocular seta 26. Pronotum, length 64 ; width 185 ; epimeral seta 26. Tergite IX, B_1 58 ; B_2 68. Tube, length 74 ; terminal setae 42. Antennal segments length 26 ; 35 ; 55 ; 45 ; 45 ; 45 ; 32 ; 29 ; terminal seta 48.

♀ (macropterous). Colour similar to male ; fore wing weakly shaded, dark only around sub-basal setae at anterior margin. Sculpture and chaetotaxy very similar to male ; probasisternal plates fused medially ; metanotum reticulate ; pelta rather broader than similar species ; fore wing thickened on anterior margin between sub-basal setae. Sternal marginal setae less than 1·5 times as long as accessory setae.

Measurements in microns of allotype. Body length 1300. Hind tibia 145. Fore wing 570. Head, length 160 ; width 140 ; postocular seta 26. Pronotum, length 74 : width 195 ; epimeral seta 29. Tergite IX, B_1 74 ; B_2 90. Tube, length 100 ; terminal setae 55. Antennal segments length 32 ; 42 ; 58 ; 52 ; 55 ; 48 ; 35 ; 32 ; terminal seta 48.

Holotype ♂. WAGINNA : forest litter, 3.vii.1966 (*P.J.M.G.*).

Allotype ♀ collected with holotype.



FIGS. 30–35. *Solomonthrips* species. Figs. 30 & 31. *striatus :* 30, Sternite VI. 31, Tergite IV. Figs. 32 & 33. *setifer :* 32, Tergite V. 33, Pelta. Figs. 34 & 35, *greensladei :* 34, Pelta. 35, Aedeagus tip.

Solomonthrips striatus sp. n.

(Text-figs. 20, 30 & 31)

♀ (macropterous). Colour yellowish, antennals IV–VIII dark brown ; sternite VI and tergites VI and VII with brown markings, thoracic sternites and tube apex brown ; fore wings shaded with median area paler ; major setae dark.

Head reticulate (Text-fig. 20), maxillary stylets retracted half way into head ; antennae very similar to *greensladei*. Thorax and appendages, and abdominal sculpture and chaetotaxy (Text-fig. 31) similar to *greensladei* ; anterior half of sternites V–VII with numerous longitudinal striations within the reticles (Text-fig. 30).

Measurements in microns of holotype. Body length 1700. Hind tibia 160. Fore wing 700. Head, length 160 ; width 160 ; postocular seta 28. Pronotum, length 100 ; width 225 ; epimeral seta 29. Tergite IX, B_1 103 ; B_2 110. Tube, length 205 ; terminal setae 80. Antennal segments length 35 ; 42 ; 80; 80 ; 74 ; 55 ; 35 ; 35 ; terminal seta 80.

♀ (hemimacropterous). Very similar to macropterous female but darker, tube brown and head shaded medially ; fore wing 550μ long, without cilia.

Holotype ♀. San Cristoval : near Wainoni, in leaf-litter on ridge at 1000 feet, 8.viii.1965 (*P.N.L.*).

Paratype ♀ hemimacropterous and 3 larvae, San Cristoval : 6 miles S.E. of Wainoni, in moss-forest litter at 2325 feet, 3.viii.1965 (*P.N.L.*).

This species is very similar to *greensladei* although the sternal reticulations are apparently quite distinctive. These striations may not be evident in specimens that have not been fully cleared however.

Larvae taken with this species are very similar to larvae taken with *greensladei* but have abdominal segment nine all brown, the head and pronotal shield bear minute microtrichia, and the major setae are shorter and more broadly expanded at the apex.

SOPHIKOTHRIPS gen. n.

Type-species : *Sophikothrips malaitae* sp. n.

Head small, broader than long ; eyes large ; postocular setae absent ; stylets retracted into base of head ; antennae eight-segmented, III with three sense cones, IV with four. Pronotum twice as long and twice as broad as head ; praepectus very weak, mesopraesternum absent ; fore tarsus with tooth ; fore wing without accessory cilia ; major setae short, apices expanded. Pelta divided into a small dark anterior portion and a transverse poorly defined posterior sclerite ; sternites with no accessory setae ; tergites with one pair of straight wing-retaining setae ; tube as long as head, apical setae shorter.

Nine species have been described in the genus *Sophiothrips* Hood, and some authors place *Nanothrips* Faure with three species and *Zaxenothrips* Crawford with one species in synonymy with this genus. Seven of the *Sophiothrips* species were described as having two long dorsolateral sense cones on antennal segments three and four, although both *bicolor* and *vorticosus* apparently have only one sense cone on segment three. The species included in *Zaxenothrips* and *Nanothrips* are described as having one sense cone on segment three and two on four, and these sense cones are shorter than those found in the other species. Eleven of these thirteen species have well developed interocellar setae and a laterally displaced stout postocular seta ; however *S. vorticosus* is described as having small postocular and interocellar setae, and *N. breviceps* is figured as having three small pairs of postocular setae. The small head and wide pronotum may be an adaptation to the leaf-litter habitat. The new species described below, although similar to this group, has three long sense cones on antennal segment three and four on segment four, no postocular setae except a minute one on the cheek, and moreover the maxillary stylets are not restricted to the mouth cone.

Sophikothrips malaitae **sp. n.**

(Text-figs. 13 & 14)

♀ (macropterous). Colour, head, thorax and anterior half of pelta brown, rest of abdomen yellow with apex of tube shaded ; mid and hind femora and tibiae shaded brown medially, fore tibiae shaded along external margins, fore femora shaded at base ; antennals I and II yellow, III–VI pale basally and shaded at least in apical half, VII and VIII brown ; major setae pale ; fore wing shaded in basal third, pale distally. Body weakly sclerotized with only very faint indications of sculpture.

Head small, broader than long, eyes well developed (Text-fig. 13) ; stylets retracted into base of head, mouth cone rounded, maxillary palps well developed ; no postocular setae, interocellars moderate. Antennae eight-segmented (Text-fig. 14), sensorium on II in distal half ; three sense cones on III, four on IV, two on V and VI.

Pronotum very broad, anteroangular setae not developed, other major setae rather small (Text-fig. 13) ; epimeral sutures complete ; praepectus weakly indicated by fusion of several chitinous islets, gular sclerite anterior to praepectus well developed ; probasisternum broad, spinasternum and mesopraesternum absent ; fore femora broader than head length, fore tibia not armed, fore tarsi with moderate curved tooth at inner apical margin. Mesonotum without major setae ; metanotum broader than long, median setae fine, 30μ long. Fore wing bent through an angle of about 5° in basal third, almost parallel-sided, cilia widely spaced except around apex, sub-basal wing setae expanded, 16μ long.

Pelta divided into an irregularly oval anterior portion and a very weakly sclerotized, apparently dumb-bell shaped posterior portion ; wing-retaining setae on tergites III–VII strong, almost straight, on tergite VIII very weak ; submedian tergal setae minute (3μ) ; tergal seta B_1 with expanded rounded apex, two thirds as long as wing-retaining seta ; lateral tergal setae not enlarged ; B_1 and B_2 on tergite IX weakly expanded at apex ; sternites without accessory setae.

Measurements in microns of holotype. Body length 700. Fore wing 450. Head, length 70 ; width 130 ; maxillary palp 26. Pronotum, length 130 ; width 320 ; epimeral seta 26. Tergite IV, wing-retaining seta 45 ; seta B_1 32. Tergite IX B_1 29. Tube, length 65 ; terminal seta 50. Antennal segments 22 ; 32 ; 39 ; 39 ; 32 ; 29 ; 25 ; 23.

Holotype ♀. MALAITA : Givarin, 24.i.1965 (*P.J.M.G.*).

Tolmetothrips granti **sp. n.**

(Text-figs. 36 & 37)

♀ (macropterous). Colour brown, head and particularly tube dark brown ; all tibiae and tarsi yellow ; antennals I and VIII dark brown, VII and base of II paler, apex of II and III–VI yellow, or VI shaded brown ; the yellow on legs and antennae is a rich golden yellow, not a bright citron-yellow ; major setae shaded but not dark except at apex of tube ; fore wings deeply shaded in distal two thirds except for a pale longitudinal stripe near the posterior margin, cilia dark.

Head about as wide as long, eyes not directed laterally and rather smaller ventrally than dorsally (Text-fig. 36) ; cheeks project behind eyes, with several pairs of small setae ; dorsal surface reticulate, postocular setae long, 100μ in holotype ; ventral surface of head without sculpture, no long setae between eyes or near posterior margin, one pair of long setae just posterior to tentorial pits ; maxillary stylets retracted as far as eyes, approaching each other in middle of head, maxillary guides well developed ; mouth cone broadly rounded, maxillary palps about 50μ long. Antennae eight-segmented, VIII weakly constricted at base but without a basal neck (Text-fig. 37) ; sensorium on II in apical half of segment ; one sense cone on III, three on IV, two (+ one) on V and VI, but the two external sense cones on IV frequently replaced by one larger cone.

Pronotum broad, at least anterior half reticulate, epimeral sutures complete (Text-fig. 36) ; all five pairs of major setae well developed (on holotype, AM 42μ ; AA 60μ ; ML 65μ ; Ep 100μ ; PA 80μ). Praepectus absent, mesopraesternum reduced, frequently absent medially. Mesonotum reticulate, lateral setae about 50μ long with expanded apex. Metanotum reticulate, median setae acute, 20μ long, 60μ apart and 70μ from anterior margin of sclerite. Fore femora weakly expanded, tibiae and tarsi unarmed ; mid and hind tibiae with a stout apical seta on external margin. Fore wing almost evenly wide, accessory cilia variable 5–10 ; three sub-basal setae in straight line, about 70–80μ long with expanded apices.

Pelta bell-shaped but posterior flange broad. Tergites reticulate laterally, lines of sculpture bear dentate microtrichia ; II–VII with two pairs of sigmoid wing-retaining setae, anterior pair only half as long as posterior pair ; marginal seta B_1 long, about 100μ ; tergite IX B_1 and B_2 with expanded apices, accessory setae small ; tube weakly constricted in basal third, apical setae rather short ; fustis very reduced. Sternites not sculptured, with a median transverse row of 7–10 accessory setae 20μ long.

Measurements in microns of holotype. Body length 2500. Hind tibia 240. Fore wing 980. Head, length 225 ; width 220. Pronotum, length 170 ; width 350. Tergite IX, B_1 145 ; B_2 140. Tube, length 225 ; basal width 98 ; apical width 49 ; longest terminal setae 160.

♂ (macropterous). Colour, sculpture and chaetotaxy very similar to female ; fore tarsus with a stout median tooth more than one third of tarsal width long ; tergite IX seta B_2 very short and stout with a broad round apex ; sternite VIII with an irregular oval glandular area anterior to accessory setae, about 100μ wide.

Measurements in microns of allotype. Body length 2200. Hind tibia 200. Fore wing 750. Head, length 190 ; width 195. Pronotum, length 160 ; width 320. Tergite IX, B_1 160 ; B_2 40. Tube, length 195 ; basal width 100 ; apical width 50 ; longest terminal seta 160.

Holotype ♀. SAN CRISTOVAL : confluence of Warahito and Pogato Rivers, from a convoluted (? leaf) gall, six inches in diameter, on a liana hanging from a banyan, 24.vii.1965 (*J. Grant*).

Allotype ♂ and numerous specimens of both sexes and immature stages taken with the holotype (69 ♀♀ and 16 ♂♂ mounted on slides).

The gall in which this species was collected was spherical, about six inches in diameter, composed of a solid mass of highly convoluted non-woody tissue. This is apparently the largest gall caused by thrips which has been recorded. Only one species has been found in the gall but there may be 10,000 individuals in this single colony. The body size was found to be remarkably constant.

The leaf-feeding Phlaeothripinae of the Melanesian region are poorly known and the generic classification of this group is rather difficult to interpret. The type-species of *Eothrips* is not known to the present author but *annulicornis* Karny has been studied and this genus apparently is distinct on account of the striate metanotum, long sense cones, and unarmed fore tarsi of the male. The new species *granti* cannot be placed in *Teuchothrips* or *Gynaikothrips* (*sensu strictu*) on account of the short head and reduced eyes, and moreover the short-headed *Gynaikothrips citritibia* Moulton, 1940 from New Britain should be placed in *Eothrips* (**comb. n**). In *citritibia*, of which the author has recently studied the holotype and allotype, the sense cones on antennals III and IV are three quarters as long as the segments, and the fore tarsus of the male does not have a tooth. Similarly *granti* cannot be placed in *Eugynothrips* as the species of that genus have long sense cones and short anterior pronotal setae.

The antennae, the sculpture and the chaetotaxy of *granti* are very similar to *smilacis* Priesner, which is a common species, rolling the leaves of a climbing plant *Smilax australis* in Eastern Australia. This is the only species at present placed in the genus *Tolmetothrips* Priesner, 1953. In *smilacis* the maxillary stylets are wide apart, low in the head and the eyes are not so reduced as in *granti*.

Priesner (1960) places the leaf-feeding, gall-forming species of the *Gynaikothrips*/*Teuchothrips*/*Liothrips* complex in the same subtribe as the fungus-feeding species of *Hoplothrips*. In the opinion of the present author, *Hoplothrips* can be distinguished from the leaf-feeding forms not only by its biology but also by the greater number of sense cones on the third antennal segment and the constricted neck at the base of segment eight. In these respects this genus is similar to the genera around *Hoplandrothrips*, and *Hoplothrips* is probably a reduced and highly successful offshoot from the fungus-feeding Phlaeothripina.

MEGATHRIPINAE

Atractothrips solomoni **sp. n.**

(Text-figs. 38, 39 & 43)

♀ (macropterous). Colour medium brown, lateral margins of head dark brown ; antennals I–II and VI–VIII dark, III–V light brown with yellow bases ; all tarsi pale, mid and hind femora and tibiae yellow at base and apex ; fore wings with two longitudinal shadings ; all setae pale.

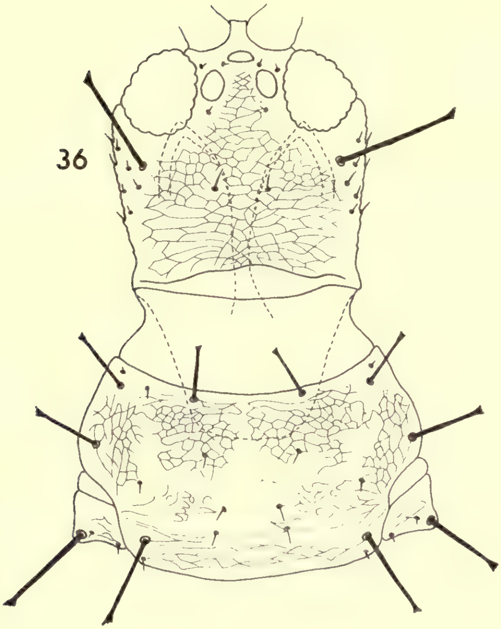
Antennae eight-segmented (Text-fig. 38) ; sensorium on II in apical half ; two (or three) sense cones on III, four on IV, major dorsal setae with weakly expanded apices. Preocular projection of head short (Text-fig. 39) ; interocellar setae large ; eyes rounded ; postocular and mid-dorsal setae well developed ; maxillary stylets widely separated ; ventral surface of head with less than ten pairs of fine setae.

Pronotum with five pairs of major setae (Text-fig. 39), anteroangulars and midlaterals on an elongate tubercle ; epimeral sutures complete ; praepectus present, mesopraesternum well developed. Fore tarsus with a minute tooth. Anterior angles of mesothorax not expanded ; fore wing slightly bent before middle, evenly wide to apex, without accessory cilia, basal setae B_2 and B_3 stout.

Pelta very broad, curving away from tergite II laterally ; tergites II–VII with one pair of wing-retaining setae near posterior margin (Text-fig. 43) ; tergite IX with B_1 and B_2 stout ; tube weakly constricted at apex. Sternal accessory setae in regular transverse row ; sternite surface anterior to accessory setae reticulate, reticles with internal markings.

Measurements in microns of holotype. Body length 2450. Hind tibia 260. Fore wing

36



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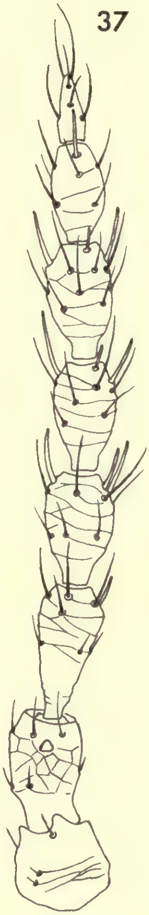

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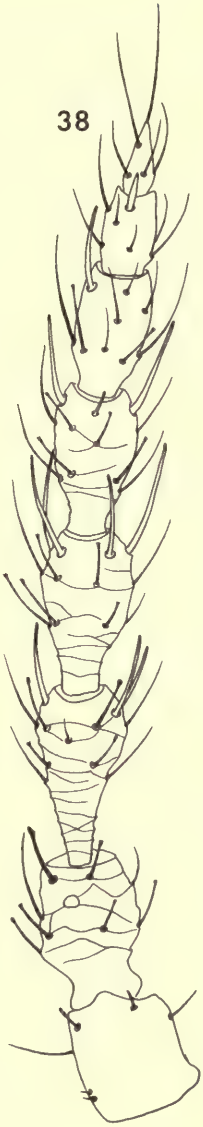

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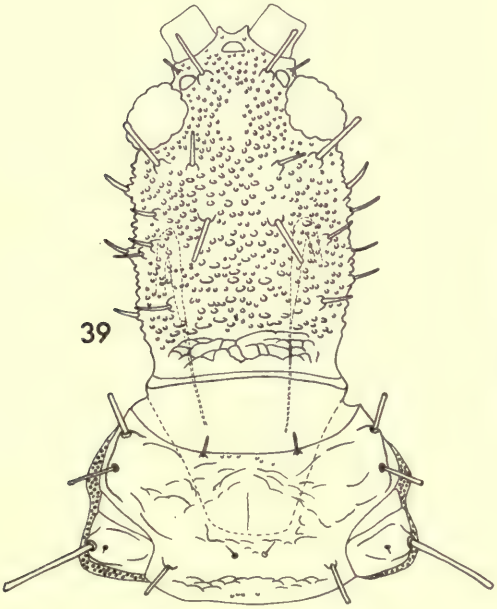

FIGS. 36–39. Figs. 36 & 37. *Tolmetothrips granti* : 36, Head and pronotum. 37, Right antenna. Figs. 38 & 39. *Atractothrips solomoni* : 38, Right antenna (external sense cones on III abnormal). 39, Head and pronotum.

950. Head, length 320 ; postocular seta 55. Pronotum, length 135 ; width 300. Tergite IX, length 97 ; B_1 70 ; B_2 80. Tube, length 290 ; terminal setae 130. Antennal segments length 45 ; 60 ; 71 ; 65 ; 58 ; 55 ; 40 ; 32.

♂ (apterous). Colour rather darker than female. Head and pronotum as in female, ocelli absent ; fore tarsus with stout claw. Tergites and sternites more heavily sculptured than female, without wing-retaining setae.

Measurements in microns of allotype. Body length 1500. Hind tibia 200. Head, length 290 ; postocular seta 60. Pronotum, length 130 ; width 260 ; epimeral seta 71. Tergite IX, B_1 65 ; B_2 80. Tube, length 225 ; terminal setae 130. Antennal segments length 50 ; 60 ; 68 ; 60 ; 55 ; 48 ; 40 ; 32.

Holotype ♀. CHOISEUL : Vasu River, 16.xi.1965 (*P.J.M.G.*).

Allotype ♂ and two paratype ♀ taken with the holotype.

This is the second species to be included in the genus *Atractothrips*. It differs very considerably from *bradleyi* Hood, 1938 from Panama, and may eventually have to be placed in a separate genus (see Stannard, 1957 ; 93–94). Four paratypes of *bradleyi* have been studied and that species differs from *solomoni* as follows :

Antennal segment II with sensorium and two stout setae at apex ; sense cones on III minute ; antennal segments long and slender, dorsal setae small and acute ; lateral ocellar setae long, interocellars small ; eyes reduced, angular in outline ; postocular setae not distinct, dorsal surface of head with about 10 pairs of setae ; pronotal midlateral setae very small, close to anteroangulars ; three small setae along anterior margin of epimeral suture ; praepectus absent ; fore tarsi unarmed in both sexes ; basal wing setae absent ; anterior angles of mesothorax projecting ; lateral metanotal sclerite with large expanded setae ; tergites with three pairs of setae at margin including wing-retaining seta and posteroangular seta ; median tergal setae and pores large ; tergites sculptured in front of antecostal ridge ; tube very long ; B_1 on IX about one quarter as long as segment ; sternal accessories not in a regular transverse row.

MACHATOTHRIPS Bagnall

Machatothrips Bagnall, 1908 : 189. Type-species : *M. biuncinatus* by monotypy.
Adiaphorothrips Bagnall, 1909 : 536–537. Type-species : *A. simplex* by monotypy.
Machatothrips Bagnall ; Priesner, 1932 : 339–344.
Machatothrips Bagnall ; Mound, 1968 : 133–135.

Females in this genus have a series of tubercles on the fore femur although these are not present in the males. Because the type-species of *Adiaphorothrips* is the male of the type-species of *Machatothrips*, several species which were described in *Adiaphorothrips*, particularly from Australia, are now referred to the older genus although they do not belong there. The following species are at present placed in *Machatothrips*.

antennatus (Bagnall, 1915), from West Sarawak.
artocarpi Moulton, 1928, from Formosa.
biuncinatus Bagnall, 1908, from New Guinea.
braueri Karny, 1912, from West Africa.
celosia Moulton, 1928, from Formosa.
haplodon Karny, 1925, from Uganda.
  = *spatiata* Priesner, 1932, from Congo. **Syn.n.**
heveae Karny, 1921, from Java.

?*isshikii* Ishida, 1932, from Japan.
montanus Priesner, 1932, from Sarawak.
quadrudentatus Moulton, 1947, from New Guinea.

Kurosawa (1968) has recently published the following synonymy of species from Japan:

M. femoralis Ishida, 1932 = *Docessissophothrips frontalis* Bagnall.
M. ohtai Ishida, 1932 = *Hoplothrips flavipes* Bagnall.
M. ipomoeae Ishida, 1932 = *Rhaebothrips lativentris* Karny.

One paratype of *spatiata* from Dr. Priesner's collection has been studied and compared with the type specimens of *haplodon*. *M. isshikii* is not recognizable as a member of this genus from its description. The species *artocarpi*, *celosia*, *heveae* and *montanus* are not at present clearly defined, and the unique holotype of *celosia* has not been studied, although type material of all the other species has been used in the preparation of the following key.

1 Mid-dorsal head setae very small, less than one quarter as long as postoculars . . 2
– Mid-dorsal head setae usually well developed, more than one quarter as long as postocular setae 4
2 Fore femur of female with about 20 small tubercles 6μ in length ; anterior angles of pronotum with several stout thorn-like setae . . . . . **antennatus** Bagnall
– Fore femora with few stout tubercles 3
3 Fore femur of female with four tubercles ; antennal III much paler than IV **quadrudentatus** Moulton
Fore femur of female with six or more tubercles ; antennal III dark with a lighter area at base and at apical exterior margin ; pronotal midlateral setae pale, more than two thirds as long as epimeral setae. . . . . . **haplodon** Karny
4 Distal tubercles on fore femur fused into a ridge . . . . . **biuncinatus** Bagnall
– Fore femoral tubercles all distinct 5
5 Antennal III dark, only basal membrane paler ; tubercles on fore femur slender, close set, forming a regular series decreasing in length towards apex, 45μ–10μ **braueri** Karny
– Antennal III yellow at base ; fore femoral tubercles stouter, more widely separated, not forming a regular series decreasing in length evenly 6
6 Fore femur with four (or five) tubercles, no tubercles on basal half of femur ; antennal III sharply yellow at extreme base, apex uniformly dark . **artocarpi** Moulton (p. 119)
– Fore femur otherwise 7
7 Fore femora with three tubercles . . . . **montanus** Priesner
– Tubercles present on most of inner margin of femora . . . . **heveae** Karny

Machatothrips artocarpi Moulton

Machatothrips artocarpi Moulton, 1928 : 322–325.

The statement in the original description that the mid-dorsal head setae are ' very small, hardly one fourth the length of postoculars ' is not correct. In the holotype these setae are almost erect but their length has been calculated by using a microscope with the vertical movement calibrated in microns. The mid-dorsal setae are about 80μ and the postoculars 180μ.

The species is apparently widespread in the Western Pacific, but as indicated above it is not clearly different from *heveae* or *montanus*. The females from the

Solomon Islands have four tubercles on the fore femora, but of three females taken together in New Guinea one has four tubercles and the other two have five.

Material studied. Holotype ♀ and allotype ♂, FORMOSA : Kagi, on *Artocarpus*, 10.viii.1927 (*R. Takahashi*). NEW GUINEA : Maffin Bay, on bark, 3 ♀, 1 ♂, ix.1944 (*E. S. Ross*) ; in California Academy of Sciences.

SOLOMON ISLANDS : Guadalcanal, in dried calyx of shrivelled coconut, 2 ♀, 2 ♂, x.1931 (*R. J. Lever*) ; Umasani River, *Areca macrocalyx* dead fronds, 2 ♀, 1 ♂, 9.vii.1965 (*P.N.L.*) ; Kukum, 1 ♀ 3 ♂, 1962 (*P.J.M.G.*).

Mecynothrips snodgrassi Hood

Mecynothrips snodgrassi Hood, 1952 : 294.
Mecynothrips snodgrassi Hood ; Mound, [in press].

This species was described on a single oedymerous male from the SOLOMON ISLANDS : Big Florida Island, on a shrub along jungle trail, 29.xi.1944 (*H. E. Milliron*). Species of *Mecynothrips* are also known from New Guinea, Kei Islands, Manus Island, New Britain and Eastern Queensland. The genus has recently been revised and *snodgrassi*, which is only known from the Solomon Islands, can be distinguished by the apical expansion of the fore tibia lying parallel to the fore tarsal claw.

Material studied. BIG FLORIDA ISLAND : Tulagi, 1 ♂, 2.ix.1960 (*C. W. O'Brien*). GUADALCANAL : Gold Ridge at 600 m, 1 ♂, 22.vi.1956 (*J. L. Gressitt*), in the Bishop Museum collection, Hawaii.

***OMMATIDOTHRIPS* gen. n.**

Type-species : *Ommatidothrips lawrencei* sp. n.

This genus is erected for a species in which the head is strongly sexually dimorphic, but in which both males and females have an area of clear cuticle on each cheek posterior to the compound eyes, apparently representing a single isolated ommatidium. Eyes of this type have not previously been described in the Thysanoptera, but apterous females of a second species of this genus have been collected by the author on dead grass in Northern Queensland, Australia.

Large brown, non-sculptured species, feeding on fungal spores. Head long, dorsally elevated, eyes rather small, with one ommatidium separate on each cheek ; cheeks convex with stout spines in male, weakly concave with fine setae in female ; postocellar and postocular setae long ; stylets approach each other in middle of head, mouth cone rounded with large maxillary palps. Fore tarsus armed in both sexes ; wings, when present, of equal width with few accessory cilia. Pronotum emarginate anteriorly, anteroangular setae not arising at margin ; epimeral sutures complete, praepectus present. Tube almost as long as head, with many fine setae ; both sexes with B_2 on tergite IX less than half as long as B_1 ; abdominal tergites with one pair of wing-retaining setae.

The relationships of this new genus within the Megathripinae are not clear. The long head with the maxillary stylets approaching each other medially suggests *Megalothrips*, but in that genus there is a stout seta on the cheek behind each eye

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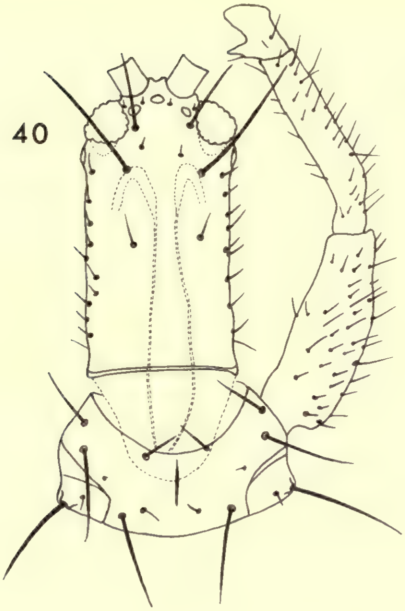

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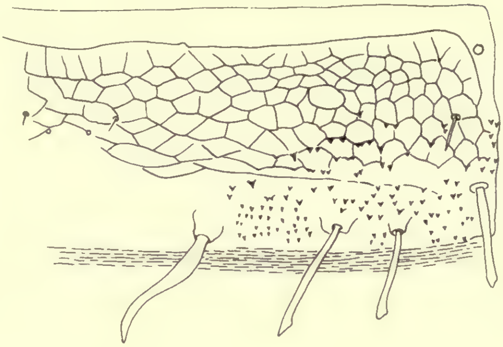

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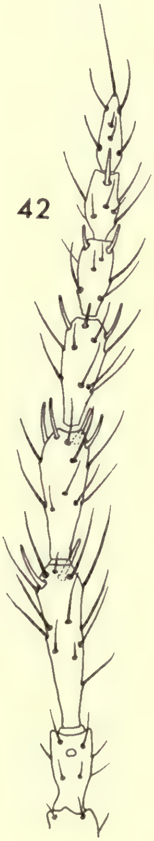

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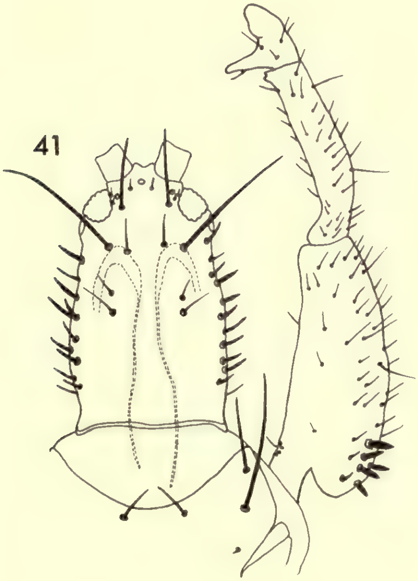

Figs. 40–43. Figs. 40–42. *Ommatidothrips lawrencei* : 40, Head, pronotum and fore leg of female. 41, Head and fore leg of male. 42, Left antenna. Fig. 43. *Atractothrips solomoni*, tergite IV.

and the males have a pair of drepanae on abdominal segment six. The new species is unusual in the subfamily in having the seta B_2 on tergite nine of the male less than half as long as B_1, and in this character it resembles *Abiastothrips*. Several genera which Priesner (1960) places in the Cryptothripina are regarded by Stannard (1957) as being quite unrelated and as belonging in the subfamily Phlaeothipinae. Certain of these genera have the head elevated in the midline and do not have three equally long pairs of setae on tergite nine in the males. The present author considers that at least *Abiastothrips* belongs in the Megathripinae, near to *Cryptothrips*, and it is to these forms that the new genus is most closely related.

Ommatidothrips lawrencei sp. n.

(Text-figs. 40–42)

♀ (macropterous). Colour medium brown, increasingly dark toward posterior, tube black in basal two thirds ; major setae light brown ; legs yellowish, fore femora sometimes darker ; basal half of antennal III and apex of II yellow, rest of antenna light brown, wings weakly shaded.

Head long, weakly elevated in midline, with very faint sculpture (Text-fig. 40) ; cheeks weakly expanded behind eyes, bearing an isolated ommatidium on each side ; cheeks parallel-sided or weakly concave, with about seven pairs of setae ; one pair of postocular and postocellar setae almost as long as head-width, middorsal head setae about one third as long as head width ; maxillary stylets broad, band-like, approaching each other in midline ; mouth cone rounded, maxillary palps 100μ long. Antennae on a short preocular process, eight-segmented ; sensorium on II in apical half of segment ; two sense cones on III, four on IV ; VIII constricted at base (Text-fig. 42).

Pronotum not sculptured, anterior margin thickened and deeply concave ; epimeral sutures complete ; epimeral setae more than three times as long as anteromarginal setae, remaining prothoracic setae about two thirds as long as epimerals ; praepectus narrow, transverse ; probasisternal plates large with four long setae on anterior margin ; mesopraesternum shallow boat-shaped. Mesonotum with three pairs of fine setae less than 20μ long, with faint lines of sculpture. Metanotum not sculptured medially, median setae about 50μ long. Fore femora moderately thickened, external margin with long fine setae ; fore tibiae slender ; fore tarsal tooth shorter than width of tarsus. Fore wings almost parallel-sided, about 90μ wide medially and 100μ wide subapically ; 12–15 accessory cilia ; only two pairs of major sub-basal wing setae, about 130μ long, B_1 fine and hair like 30μ long.

Pelta broad, not trilobed, weakly reticulate in anterior half. Tergites III–V with one pair of sigmoid wing-retaining setae, tergites II and particularly VI and VII with weak almost straight wing-retaining setae ; tergites III–VI laterally with a group of about 12 fine setae anterior to B_1 and B_2, these groups of setae extend medially across the tergites of the posterior segments so that IX bears two irregular transverse rows of fine setae ; B_2 on IX less than half length of B_1 ; sides of tube straight with numerous fine setae about 30μ long, base of tube 130μ, apex 55μ wide, longest terminal seta about 230μ. Sternites with transverse row of about 15 accessory setae 40μ long, sternites VII and VIII with accessory setae in two transverse rows ; B_1 on sternites at least twice as long as B_2, arising well in front of posterior margin.

Measurements in microns of holotype with range from five paratypes in parentheses. Body length 3400 (–3800). Hind tibia 450. Fore wing 1250. Head, length 450 (–470) ; width. behind eyes 240 ; postocular seta 230 (210–240). Pronotum, length 130 ; width 350 (–390) ; epimeral seta 190 (–225). Tergite IX, B_1 350 (340–360) ; B_2 115 (–160). Tube length 420 (–450). Antennal segments III–VIII, 160 (–170) ; 130 (–135) ; 115 ; 80 ; 70 (65–) ; 80 (68–).

♂ (apterous). Colour similar to female, setae brown on cheeks and base of fore femora. Head weakly elevated in midline, without sculpture (Text-fig. 41), cheeks convex medially with about 10 stout setae ; ocelli absent, otherwise similar to female. Pronotum as in female except that posteroangulars almost equal epimerals, setae particularly long in oedymerous males ; fore femur broad with about 6 stout cyathiform setae at posterior external angle ; fore tibia with a small tubercle close to apex ; fore tarsus stout, longer than tarsal width (Text-fig. 41). Abdominal tergites with reduced wing-retaining setae, VI–IX with transverse row of fine setae ; sternites, tergite IX and tube similar to female, although tube comparatively short, narrowing from 130μ to 50μ.

Measurements in microns of allotype with range from three paratypes in parentheses. Body length 3400 (3200–3500). Hind tibia 400 (–420). Head, length 410 (–460) ; width behind eyes 220 (200–) ; postocular seta 225 (–240). Pronotum, length 130 (–200) ; width 450 (–560) ; epimeral seta 250 (–320). Tergite IX, B1 330 (320–360) ; B2 115 (95–). Tube length 350 (320–360). Antennal segments III–VIII, 145 (–160) ; 105 (–120) ; 95 (–105) ; 65 (–70) ; 65 (58–) ; 70.

Holotype ♀. GUADALCANAL : near Honiara, Poha River, 19.xi.1965 (*P.N.L.*).

Allotype ♂. GUADALCANAL : Mt. Austen, in litter between buttress roots of tree, 4.vii.1966 (*P.J.M.G.*), collected with 2 ♀, 3 ♂ paratypes and 2 larvae.

Other material. GUADALCANAL : Umasani River, in forest leaf-litter, 1 ♀ and 1 larva, 5.vii.1965 (*P.N.L.*) ; Mt. Austen, in forest litter, 4 ♀, 1 ♂ and 1 larva, 29.xi.1963 (*P.J.M.G.*) ; Mt. Austen, 2 ♀, 8.ii.1966 (*P.J.M.G.*). KOLOMBANGARA : 2 ♂, 9.vi.1965 (*P.J.M.G.*). NEW GEORGIA : Munda, 3 ♀ and 11 larvae, 15.ii.1966 (*P.J.M.G.*). RENDOVA : 1 ♂, 6.v.1966 (*P.J.M.G.*). CHOISEUL : Vasu River, 1 ♀, 1 ♂, 16.xi.1965 (*P.J.M.G.*).

Rhaebothrips lativentris Karny

Rhaebothrips lativentris Karny, 1913 : 128–129.

The genus *Rhaebothrips* was erected by Karny for the species *lativentris*, based on a single male from Formosa. Two further species have been described in the genus, *major* Bagnall, 1928 from Samoa, and *fuscus* Moulton, 1942 from Guam, Fiji and the Torres Straits. Karny (1924) recorded *lativentris* from Queensland, and there are specimens determined as that species by Karny in Dr. Priesner's collection from Ponape. Moulton (1944) recorded *major* from Fiji but did not refer to his species *fuscus* in that paper, although his remarks on the variation in *major* would appear to include *fuscus* as a variety. The unique holotype of *major* is lost (Mound, 1968), but Bianchi (1953) states that Moulton's specimens from Hawaii and Fiji can be separated from new specimens available from Samoa.

At present it is not possible to be certain of the specific identity of the Solomon Islands representatives of this genus, but it seems that there is just one widespread species involved. The specimens from Ponape mentioned above vary greatly in size, both within and between sexes. In the specimens listed below, it has been noted that the tube is shorter than the head in micropterae but longer than the head in macropterae. However the tube is relatively longer in males than in females.

Material studied. NEW GEORGIA : Munda, 1 ♀, 1 ♂ (mac.), 15.ii.1966 (*P.J.M.G.*). GUADALCANAL : Mt. Austen, under bark, 1 ♀ (mic.), 24.xi.1965 (*P.J.M.G.*) ; Lunga, 1 ♀ (mic.), 15.iii.1963 (*P.J.M.G.*). SAN CRISTOVAL : 10 miles south of Wainoni, litter 3 feet up palm stump, 1 ♂ (mic.), 27.vii.1965 (*P.N.L.*) ; 6 miles S.E. of Wainoni, in ground moss of forest, 1 ♀ (mic.), 3.vii.1965 (*P.N.L.*). VATILAU : 1 ♀ (mac.), 2.xii.1965 (*P.J.M.G.*).

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A REVISION OF THE GENUS *CATOPTROPTERYX* KARSCH (ORTHOPTERA : TETTIGONIIDAE)

BRITISH MUSEUM NATURAL HISTORY

J. HUXLEY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 5
LONDON : 1970

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BRITISH MUSEUM
FEB 1970
NATURAL HISTORY

BY

JOHN HUXLEY

British Museum (Natural History)

Pp. 127–170; 1 *Plate,* 95 *Text-figures*

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World List abbreviation
Bull. Br. Mus. nat. Hist. (Ent.).

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 30 *January,* 1970

Price £1 10s.
(£1·50)

A REVISION OF THE GENUS *CATOPTROPTERYX* KARSCH (ORTHOPTERA : TETTIGONIIDAE)

By JOHN HUXLEY

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SYNOPSIS

The African genus *Catoptropteryx* Karsch is fully revised and a key is given to the species. Three specific synonyms are newly established and seven new species are described.

INTRODUCTION

KARSCH erected the genus *Catoptropteryx* in 1890 for a single new species, *C. guttatipes*, from Cameroon. In 1896 he described a further six new species and suggested that closely related to these were three of the four African species described in *Caedicia* Stål, of which, however, he formally transferred only *Catoptropteryx afra* (Karsch). Kirby, in his catalogue of 1906, listed eleven species of *Catoptropteryx* Karsch and included all the African species of *Caedicia* Stål. No new species has been recorded since 1896, with the exception of *C. latipennis* Chopard, 1955, which is considered here to belong to another genus (see below). Although up to the present time the genus *Catoptropteryx* Karsch has been remarkably homogeneous and easily recognized, there has always been considerable difficulty in the separation of the species. The present work, while attempting to remove this difficulty, inevitably extends the morphological and geographic boundaries of the group, making it more heterogeneous and less readily characterized. Over 1200 specimens have been examined, including all the type material. Seven new species are described, three specific synonyms are newly established and lectotypes are designated for *C. signatipennis* Karsch and *C. neutralipennis* Karsch. In the course of examining the ovipositor as a source of taxonomic characters it was necessary to homologize its parts in order to establish a terminology generalized enough for use in taxonomic studies on other Tettigoniidae.

Catoptropteryx latipennis Chopard, as mentioned above, is incorrectly placed in this genus and is removed from it by the following synonymy, based on an examination of the type-specimens:

Symmetropleura plana (Walker)

Phaneroptera plana Walker, 1869 : 339. Holotype ♂, SOUTH AFRICA : Natal (BMNH) [examined].
Tylopsis plana (Walker) Kirby, 1906 : 441.
Symmetropleura plana (Walker) Ragge, 1964 : 298.
Catoptropteryx latipennis Chopard, 1955 : 267. Holotype ♂, SOUTH AFRICA : Cape Province, Tzitzikama Forest, Stormsrivierpiek (UZI Lund) [examined]. **Syn. n.**

ACKNOWLEDGEMENTS

I want to express my gratitude to the following specialists who, directly or indirectly, have made available to me type specimens and other material from their respective institutions:

Mr. P. Basilewsky, Dr. W. Bazyluk, Dr. M. Beier, Dr. I. J. Cantrall, Mr. R. H. Carcasson, Dr. M. Descamps, Mr. M. Donskoff, Mr. Y. Gillon, the late Dr. H. J. Grant, Dr. K. K. Günther, Dr. R. Kumar, Mr. M. Lamotte, Professor C. H. Lindroth, Miss J. M. McKay, Mr. E. Morales Agacino, Dr. E. C. G. Pinhey, Dr. D. C. Rentz, Dr. C. H. F. Rowell, the late Dr. G. van Son, Mr. L. D. E. F. Vesey-Fitzgerald, Mr. J. A. Whellan.

My especial thanks are due to Dr. D. R. Ragge for valuable criticism and advice during the preparation of this work ; to Professor G. G. E. Scudder for his comments on the interpretation of the ovipositor homologies ; and to Dr. M. C. Eluwa for observations on the biology of *Catoptropteryx* Karsch and the use of his photograph of the eggs (Plate 1, fig. 1).

MATERIAL

The museums and other institutions listed below have provided the material for this study. The abbreviations used in the text to refer to type-depositories are given in parentheses.

Academy of Natural Sciences of Philadelphia (ANS) ; British Museum (Natural History) (BMNH) ; California Academy of Sciences, San Francisco (CAS) ; Coryndon Museum, Nairobi (CM) ; Instituto Español de Entomología, Madrid (IEE) ; Instytut Zoologiczny of the Polska Akademia Nauk, Warsaw (IZPAN) ; Laboratoire d'Entomologie, Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (ORSTOM) ; Makerere University College, Kampala (MUC) ; Musée Royal de l'Afrique Centrale, Tervuren, Belgium (MRAC) ; Muséum National d'Histoire Naturelle, Paris (MNHN) ; Museum of Zoology, University of Michigan, Ann Arbor (MZUM) ; National Museum, Bulawayo (NM) ; Naturhistorisches Museum, Vienna ; Transvaal Museum, Pretoria (TM) ; Universitetets Zoologiska Institution, Lund, Sweden (UZI) ; University of Ghana, Accra (UG) ; Zoologisches Museum of the Humboldt-Universität, Berlin (ZMHU).

TREATMENT

It has been found necessary in attempting to provide a reliable means of identification of the species of *Catoptropteryx* Karsch to make use of a few characters hitherto not commonly employed in taxonomic work on the Tettigoniidae. One class of characters that may deserve comment is that based on the coloration of the integument. Many workers still tend to regard colour characters as unreliable in the sense that they are so often subject to individual variation as to be of dubious value in differentiating the species. However, the level of significance of differences in coloration, as with any other type of structural difference, varies from group to group, and there is no doubt that within this genus alone a particular feature of the colour pattern may show a consistent difference between a certain two species while in other species the same difference is embraced by intraspecific variation. In using the present revision, therefore, where a colour character is in the same state in all the examined material of a species, the value of this should not be underestimated but assessed as a function only of the number of specimens on which the description is based.

Much work has been done, especially in recent years, on the acoustic behaviour of Orthoptera and the high taxonomic significance of song patterns is widely recognized. However, although the nature of sounds produced by Ensifera is clearly dependent in part on the structure of the stridulatory organ, and although this structure can be fairly readily examined in dead specimens, very little use has been made of this as a source of characters in systematic work on the group. The present work makes use of the three most easily examined attributes of the stridulatory file, namely its gross appearance, length and number of teeth. The drawings of files were made from stained and cleared preparations of actual specimens, using a microprojector. The measurement of tooth number and file length was made on nitrocellulose replicas of a subsample of each species. The technique for making the replicas was essentially that described by Ragge (1969 : 172). A drop of 5% ammonia solution containing a trace of detergent as a wetting-agent was used to relax the wing base. To obtain sufficiently robust replicas from this genus it was necessary to coat the whole of the proximal centimetre of the ventral surface of the wing. The replicas were examined by diffuse transmitted light. ' Tooth number ' (T) includes all the teeth, however rudimentary, that can be discerned under the low power (× 100) of a microscope. ' File length ' (F), which was measured using a screw micrometer eyepiece, is the linear distance between the first and last tooth. The measurements made on replicas do not differ significantly from those made on the wing itself. Both tooth number and average tooth density (T/F) were found to be useful characters. The interspecific and infraspecific variation in these variates is shown in the scatter diagrams of tooth number on file length (Text-fig. 1). In any one species, there is a broad correlation between tooth number and file length, as might be expected, but for the genus as a whole there is no such significant correlation owing to the large variation of average tooth density between species. For example, the sample mean of this last variate is 24·56 (teeth per mm) for *C. aurita* sp. n. and 63·51 for *C. nanus* sp. n., producing widely separated clusters of

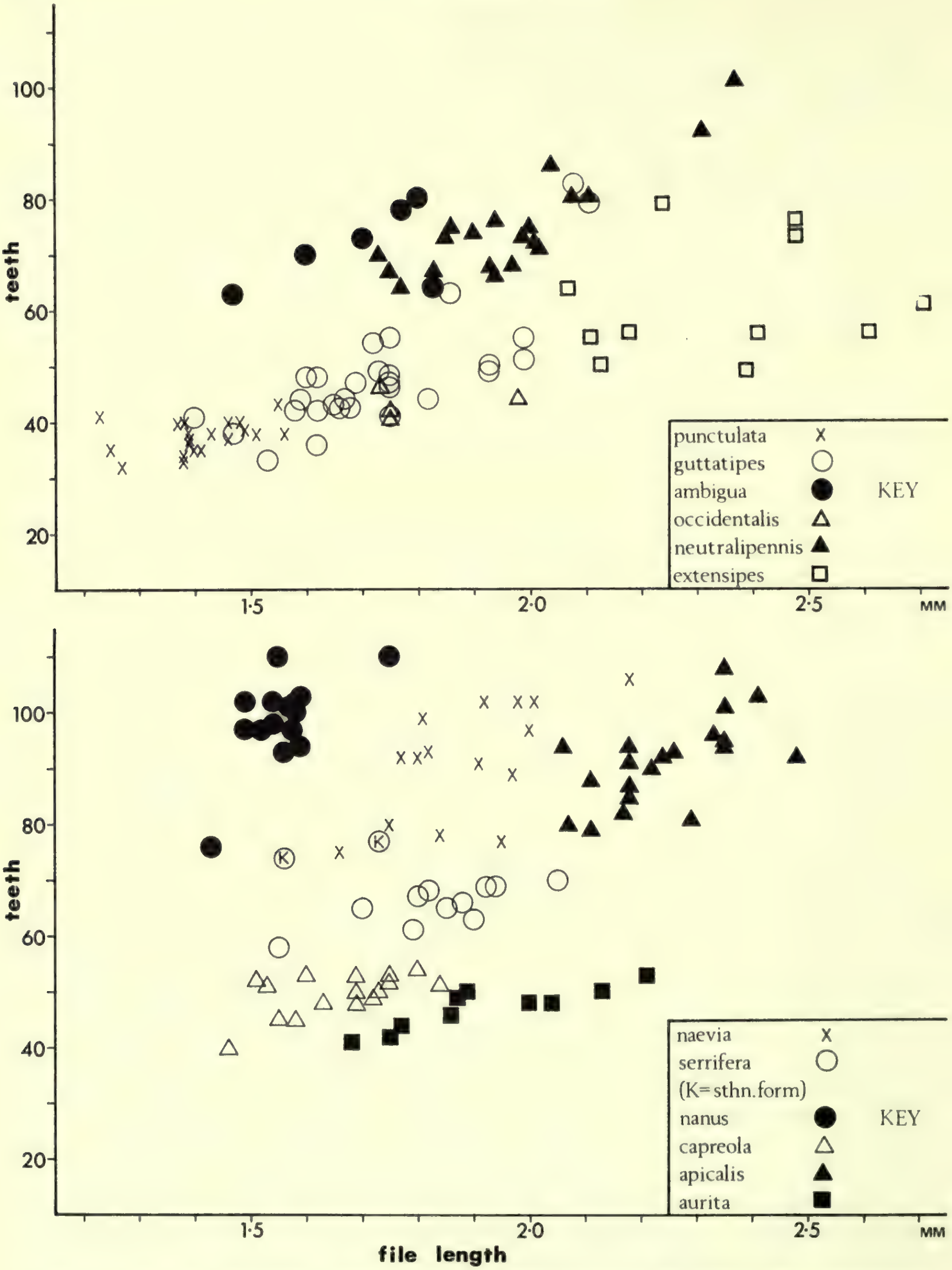


FIG. 1. Scatter diagrams of tooth number plotted against file length for the left male stridulatory file of *Catoptropteryx* spp.

points for these two species. While there is of course considerable overlap, for the samples plotted each species does have a characteristic distribution of points and many pairs of species can be clearly differentiated by simultaneous consideration of tooth number and file length.

Although the form of the ovipositor valves is frequently used in the systematics of the Phaneropterinae, little use is made of the more complex assembly of sclerites at their base. This constitutes a mechanism for the control of the movements of the valves, in particular during oviposition, and its structure probably relates closely to oviposition behaviour. This aspect is peripheral to the present study except insofar as it is suggested that the form of the basal mechanism, like that of the valves themselves, is likely to be maintained within narrow limits of variability, and for this reason may be expected to provide reliable characters for the identification of the species. The shape of the basal sclerites is complex in many Phaneropterinae, and almost always so in those genera, like *Catoptropteryx* Karsch, in which the valves are abnormally small, and whatever the functional significance of the form may be its variation from species to species is often discrete and readily perceived. Too commonly in the Tettigoniidae the males of a group of species may be easily distinguished by clear differences in their genitalia, while identification of the females relies heavily on their topographic association with identifiable males. In many such cases study of the basal mechanism of the ovipositor reveals good specific characters, and on the assumption based on this observation, that further use will be made of this structure in future work on phaneropterine taxonomy, I have considered it advisable to establish a morphological nomenclature at once rather than lay the foundation of a confusing diversity of terms by constructing an *ad hoc* terminology on a purely descriptive basis. Apart from the retention of the terms ' dorsal valves ' and ' ventral valves ', already commonly used and unambiguous in meaning, in preference to ' gonoplac ' and ' first gonapophysis ', the ovipositor is described using the nomenclature of Scudder (1961*a*, 1961*b*, 1964). Scudder and Harz intend to propose the terms ' supragonangulum ' and ' infragonangulum ' for the anterodorsal and posteroventral divisions of the gonangulum of the Tettigoniidae (Scudder *in lit.*) and I am anticipating the publication of their work by adopting these terms here. The structure, interrelationships and homologies of the sclerites of the ovipositor of *Catoptropteryx* Karsch were determined by examination of examples of all the species well represented in the available material. The abdomens of dried specimens were macerated in 10% potassium hydroxide and studied under isopropyl alcohol and in cleared and stained slide preparations. The results of this investigation are summarized diagrammatically in Text-fig. 2. The most useful specific differences in the basal mechanism are to be found by examining the form and relative sizes of the lobe of the infragonangulum (*iga*) and the first gonocoxa (*gc* 1), and the spatial relationship of these sclerites to each other. The supragonangulum (*sga*) and second gonocoxa (*gc* 2) also show specific differences but these tend to be less well defined and the sclerites are not always so readily examined in dried material. The subtlety of shape of the ovipositor parts makes verbal diagnosis difficult and this has therefore been minimized in the species descriptions, reliance being placed almost entirely on the text-figures for comparison of ovipositor characters. When comparing specimens with the text-figures it is essential to bear in mind the possible effects of a number of factors, the operation of which leads to a misleading diversity in the appearance of ovipositors of the same species. All the drawings have been made from dried specimens in which the process of drying causes variable distortion of sclerites, variable lateral displacement of the subgenital plate, and variation in the degree to which the anterior part of the basal mechanism is concealed by the ninth and tenth abdominal tergites. Further, as the ovipositor in life consists of a system of moving parts, the positions of the parts relative to one another are subject to variation ; for example, in Text-fig. 2, anticlockwise rotation of the plate formed by the fused gonangulum and first gonocoxa would result in an anterior displacement of the second gonocoxa and dorsal valve, posterior displacement of the ventral valve, and partial concealment of the supragonangulum beneath the ninth abdominal tergite. This sort of change produces an unexpectedly large diversity in the gross appearance of the ovipositor.

Every species description includes the ranges in the material examined of certain linear measurements commonly found to be useful in tettigoniid taxonomy at this level. All measurements are given in millimetres. Means are not given for two reasons : the samples are extremely heterogeneous and the relative contributions of geographic and intrapopulational variation to the value of the mean are not

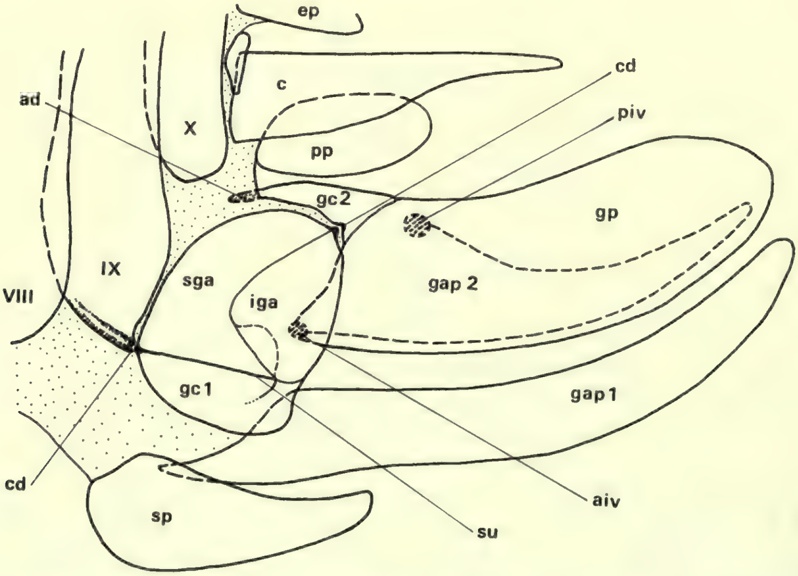


FIG. 2. Diagram of the ovipositor of a generalized *Catoptropteryx* sp. Membrane is shown stippled. *ad*, apodeme ; *aiv*, anterior intervalvula ; *c*, cercus ; *cd*, condyle ; *ep*, epiproct ; *gap* 1, first gonapophysis (= ventral valve) ; *gap* 2, second gonapophysis ; *gc* 1, first gonocoxa ; *gc* 2, second gonocoxa ; *gp*, gonoplac (= dorsal valve) ; *iga*, infragonangulum ; *piv*, posterior intervalvula ; *pp*, paraproct ; *sga*, supragonangulum ; *sp*, subgenital plate ; *su*, suture ; VIII, IX, X, terga.

assessed ; even in a (biologically) homogeneous sample knowledge of the mean alone, with no estimate of the variance or skewness of the distribution, is not very useful. Measurements were made using calipers, with the exception of the file length (see above) and the median length of the pronotum, for both of which a screw micrometer eyepiece was used. ' Total length ' means the distance from the most anterior part of the head (excluding its appendages) to the tip of the flexed hind wings. ' Length of fore wings ' is the distance from the distal margin of the second axillary sclerite to the apex of the wing, and is conveniently measured by inserting one point of the calipers into the small notch in the wing extending distad from this sclerite.

In descriptions of the legs and antennae the terms ' internal ', ' external ', ' dorsal ' and ' ventral ' refer to these appendages in standard positions, the antennae and fore legs directed forwards and the mid and hind legs directed backwards.

The wing-venation is described using the nomenclature of Ragge (1955). The veins used in the diagnosis of *Catoptropteryx* spp. are illustrated and named in Text-fig. 65.

TAXONOMIC STRUCTURE

It may be necessary to stress that throughout this paper, where expressions such as ' affinity ' and ' related ' are used without qualification no phyletic meaning is intended, such terms referring only to the degree of morphological resemblance observed. Whether phyletic information can be inferred from the evidence of the few morphological characters studied in this revision is another matter.

Text-fig. 3 is a schematization of the affinities of the species of *Catoptropteryx* Karsch based on an intuitive selection of characters from the ovipositor, fore wing venation, eyes, tympanic organs and male cerci. It is not based on a rigorous phenetic analysis but is merely an attempt to give visual form to a largely subjective assessment of the relations among the species. It can be seen that the genus falls into three principal species-groups comprising respectively 1) *extensipes*, 2) *aurita* and *serrifera*, and 3) the remaining twelve species. The second group is linked to the third both morphologically and geographically by *C. serrifera* sp. n. The third and largest group subdivides itself fairly readily into the following three subgroups : i) *nanus*, *ramulosa*, *capreola* and *naevia ;* ii) *apicalis*, *afra* and *neutralipennis ;* iii) *ambigua*, *nigrospinosa*, *punctulata*, *guttatipes* and *occidentalis*. Of these, ii) and iii) are strongly linked through *C. neutralipennis* Karsch.

C. aurita sp. n. is the only species in which the internal auricle of the tympanic organs is at all developed. Although in the Phaneropterinae this most commonly has the status of a generic character, the inclusion of *C. aurita* sp. n. in this genus, with the consequent heterogeneity of the latter, is justified by the observation that *C. serrifera* sp. n., which has no tympanic auricles, is rather more closely related to the auriculate species than it is to the rest of the genus. I can find no real justification for the attachment of special taxonomic significance to the difference in the tympanic organ of these two species. Morphogenetically, the difference might readily be assumed to be trivial in that the auriculate form could be simply derived from the open form by a slight expansion of the ventral internal rim of the tympanic opening. The reverse transformation is equally feasible. A decision as to which may be the primitive and which the derived form of this structure might be of some biogeographic interest, as the auriculate species is the only one with an East African distribution. This decision clearly cannot be based on the kind of evidence available here. However, one purely speculative possibility is that the auriculate form is primitive and the open form derived from it. It might be supposed for example that in an environment in which predation pressure is high, selection would favour reduction of the auricle to give completely open tympana, which could be the more

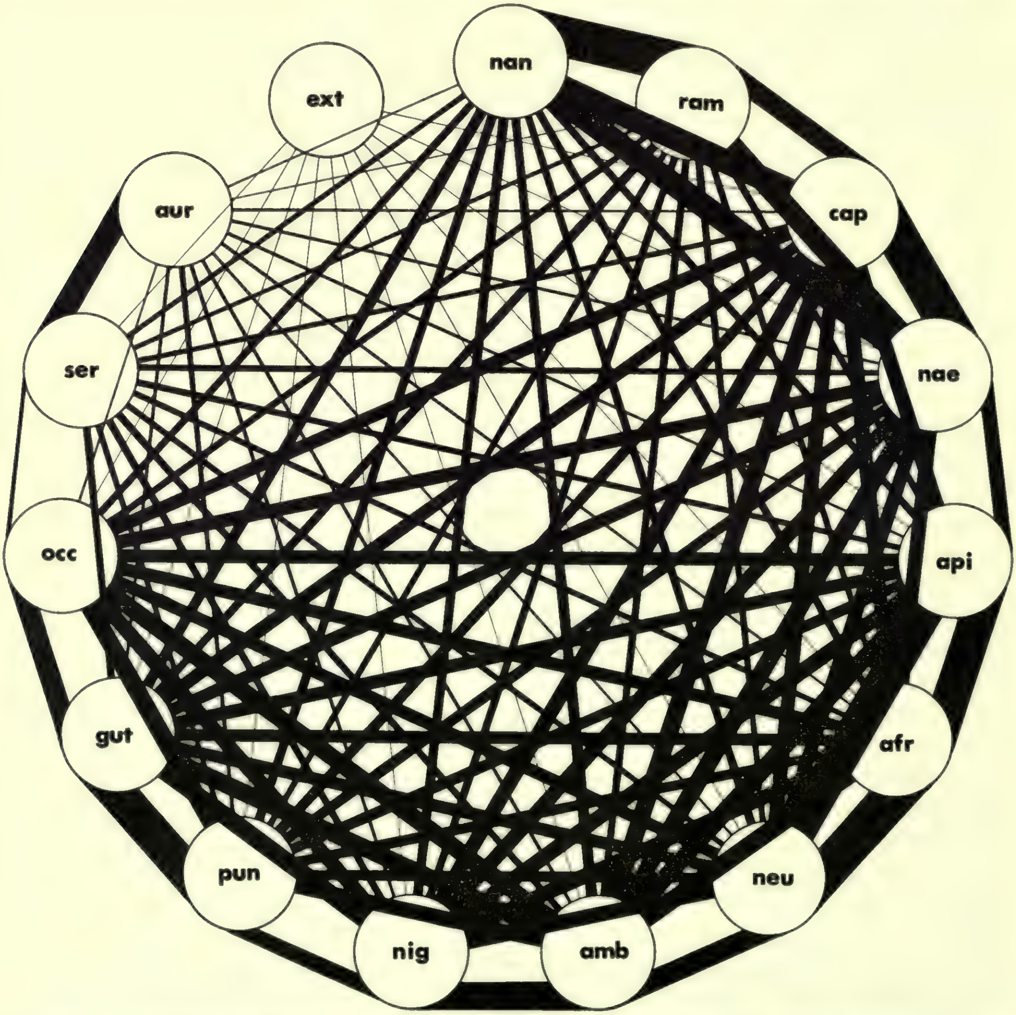


FIG. 3. Schematic diagram of the affinities of the species of *Catoptropteryx* Karsch. The thickness of the line joining two species is a measure of their morphological resemblance. (See text, p. 135).

efficient condition for nondirectional defence responses. If, moreover, the population density were high, reduction of mating efficiency by a reduction of the efficiency of directional responses to acoustic stimuli might not be a dominant selective factor. On the other hand, under conditions of low predator density and sparse populations, directional response capabilities may be favoured over nondirectional, and the auricle retained.

BIOLOGY

Nothing has been published relating to the biology of any of the species of *Catoptropteryx* Karsch. Moreover, since all the properly documented material examined was collected in light-traps, I have virtually no evidence in respect of ecological information. Enquiries made of collectors have not enabled any conclusions to be reached on this issue. The collecting localities almost all lie within areas of moist lowland forest or forest-savanna mosaic and several collectors suggest that it is likely to be a forest-dwelling genus. Dr. M. C. Eluwa, formerly of the University of Ibadan, however, has suggested (*in lit.*) that the principal habitat of the genus may be the bushes characteristic of farm lands. A few of the specimens examined had feculae attached and microscopic examination of these has revealed plant material only, without any trace of animal parts. In his laboratory Dr. Eluwa has fed specimens of an unidentified species of *Catoptropteryx* Karsch with tender leaves of *Ficus* sp. The dense sensory bristles of the valves of the ovipositor and their lack of teeth in the majority of species indicate that eggs are not usually deposited within plant tissues, and the small size of the valves argues against the use of deep crevices in soil or bark as oviposition sites. Dr. Eluwa supports this deduction with a single observation of oviposition in the laboratory. A row of 29 eggs was deposited along a vein on the abaxial surface of a *Ficus* leaf (see Plate 1, fig. 1).

CATOPTROPTERYX Karsch

Catoptropteryx Karsch, 1890*b* : 361. Type-species, by monotypy, *Catoptropteryx guttatipes* Karsch, 1890.

♂ ♀. Small to medium size. Integument generally smooth and shiny.

Length of antennae about 1¼ times total length ; margin of antennal scrobes not, or only slightly, extending above fastigium of frons. Fastigium of vertex compressed, narrow, width less than half width of first antennal segment, horizontal or very slightly declinate, sulcate dorsally. Fastigium of frons triangular, acuminate, almost meeting ventral surface of fastigium of vertex. Eyes large to very large, more or less prominent, sub-globose or slightly elliptical.

Pronotal disk more or less planar, lateral margins diverging posteriad, anterior margin straight or slightly concave, posterior margin moderately to strongly convex ; lateral lobes of pronotum more or less planar, meeting disk at very slightly rounded right-angle, height usually exceeding, sometimes about equal to, length. Fore wings extending well beyond hind knees, length about 1½ times hind femur length ; *Sc* and *R* contiguous in proximal half ; R_s arising slightly proximad of centre ; cross-veins usually somewhat regular and parallel ; archedictyon fairly open-textured, membrane transparent. ♂ stridulatory organ small, without mirror ; stridulatory rib not prominent dorsally ; file with 30–110 teeth. ♀ stridulatory apparatus present, consisting of one or more thickened, transverse veinlets near posterior margin of cubito-anal area of right fore wing, each bearing dorsal row of small, regular, hook-shaped spines with points directed distad. Hind wings fully developed, extending beyond fore wings in flexed position by about ⅕ fore wing length. Fore coxae with long dorsal spine of circular transverse section. Fore femora with about 1–4 very small internal ventral spinules (often 0 in *C. extensipes* Karsch). Mid femora with about 1–4 very small external ventral spinules (often 0 in *C. extensipes* Karsch). Hind femora with about 3–6 internal and 3–6 external ventral spinules ; hind knees with 2 small spinules on each lobe. Fore and mid tibiae sulcate dorsally, each with about 1–5 internal and 1–5 external ventral spurs ; fore tibiae with usually 0, sometimes 1–2 external dorsal spurs in addition to apical ; mid tibiae with 0–3 internal dorsal spurs in addition to apical. Hind tibiae flat or somewhat convex dorsally, with well developed dorsal carinae, about 4–10 internal and 10–20 external ventral spurs, and about 20–35 dorsal spinules on each side ; apex on each side with 2 large curved ventral spurs and 1 large dorsal spur. Tympanic organs externally without auricles, internally auricle absent or (*C. aurita* sp. n.) more or less well developed.

Abdominal tergites simple, without spines ; tenth tergite of ♂ unmodified. Epiproct simple, triangular. ♂ cerci unbranched, unarmed except for small apical or subapical spinule. ♀ cerci abruptly narrowed in distal quarter. Ovipositor very small, length about ⅔ to ½ median length of pronotum ; margins of valves mostly smooth, occasionally finely crenulate or serrate at apex of dorsal valve ; basal mechanism well developed, 1st gonocoxa usually as large as or larger than infragonangulum. ♂ subgenital plate with shallow triangular excision in distal margin ; styles present, usually very small, sometimes apparently not articulated. ♀ subgenital plate simple, with apical margin entire.

General coloration pale green to olive-green, sometimes overlaid with purple-brown over fore wings, and with variable brown or black markings often present on lateral lobes of pronotum and base and apex of fore wings. Hind wings hyaline or faintly fumose (markedly fumose in *C. extensipes* Karsch). Dark areas of variable size usually present at some or all of following loci : post-ocular regions of head ; dorsal surface of antennae ; fore tibiae in region of tympanic organ, especially in lateral sulci ; hind tibiae proximally at two points on each side and one point dorsally, and around bases of ventral spurs. All spurs and spinules blackened, at least apically.

While *Catoptropteryx* Karsch is rather easily recognized (see Plate 1, figs. 2–3), it is not easy to make a brief list of diagnostic features distinguishing it from its closest relatives. It resembles quite closely *Caedicia* Stål from which it seems to be principally distinguished by its more globular eyes (or very much larger eyes in the case of *C. extensipes* Karsch) and less prominent antennal scrobes. Confusion of these genera is in practice unlikely as *Caedicia* Stål has an Australian and Austro-oriental distribution. *Dapanera* Karsch, however, is extremely similar and has a similar distribution to *Catoptropteryx* Karsch. The former genus may be distinguished by the fore wings which are broader and have a denser, more opaque archedictyon, by the well developed ovipositor, and (except from *C. aurita* sp. n.) by the auriculate inner tympanum. The most useful characters distinguishing the species of *Catoptropteryx* Karsch are undoubtedly to be found in the basal mechanism of the ovipositor (see p. 133), the male cerci and stridulatory organ (see p. 131) and the coloration of the fore wings and pronotal lobes (see p. 131). It is essential, however, for reliable determination to take into account all the characters treated in the diagnostic descriptions.

The distribution of the genus falls into two distinct areas of tropical Africa (see Text-fig. 4). *C. aurita* sp. n. has an East African distribution, while the rest of the genus has a distribution characteristic of many West African Tettigoniidae, extending from Sierra Leone and Guinea to Angola, Congo and Uganda.

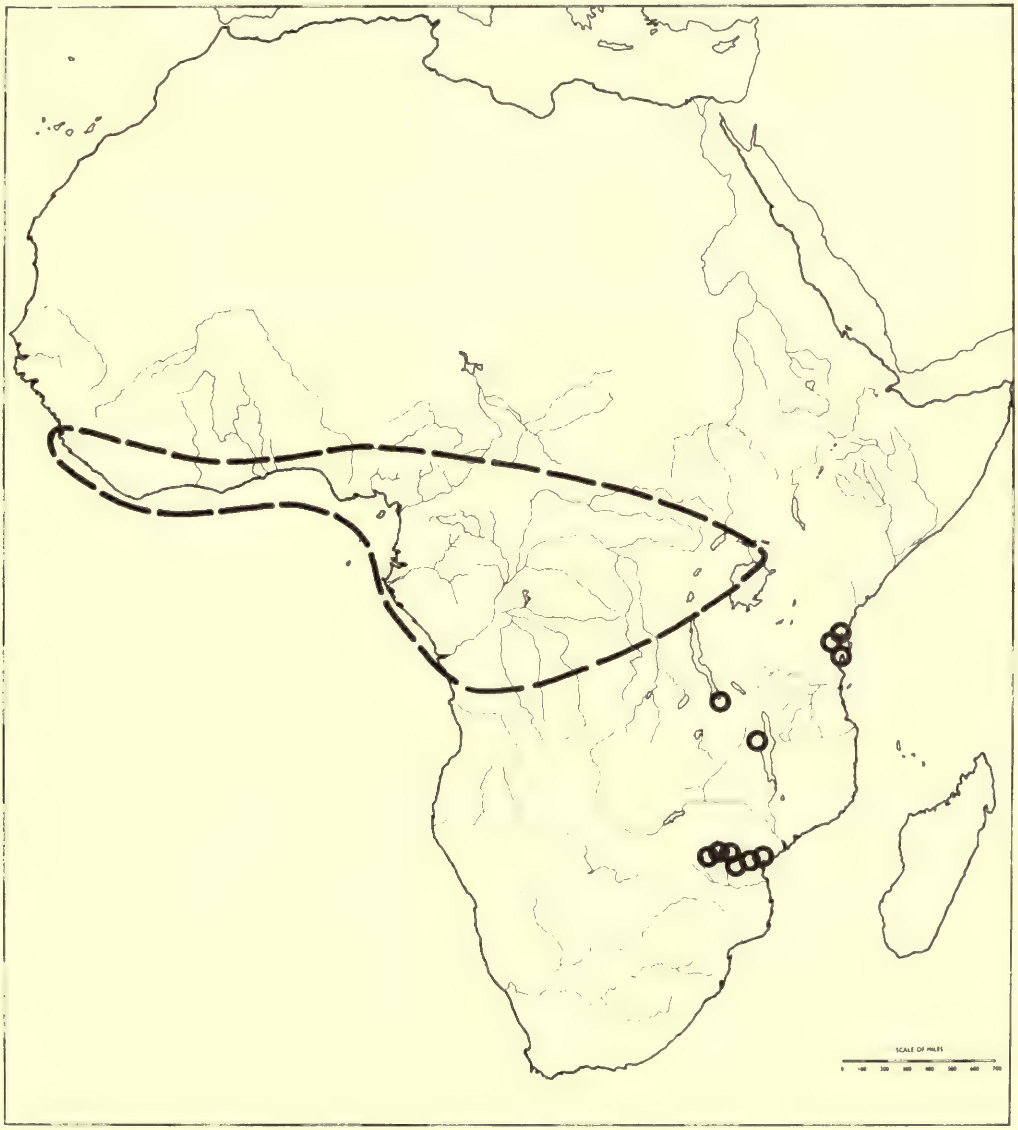
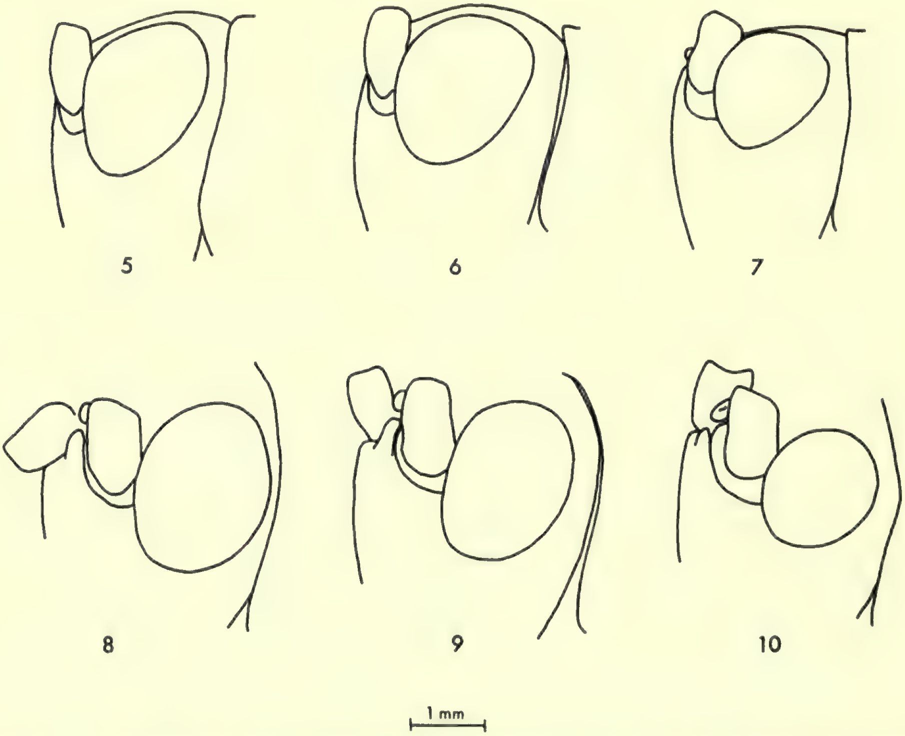

SCALE OF MILES
0
100
200
300
400
500
600
700

FIG. 4. Map showing the distribution of *Catoptropteryx aurita* sp. n. (circles), and the approximate distribution of the rest of *Catoptropteryx* Karsch.

KEY TO THE SPECIES

The characters employed in the key are chosen partly for convenience in use, and are not always those on which the most weight is placed in the diagnoses of the species. Hence, the key does not provide a complete diagnosis of each species, this being a function of the descriptions. Every specimen, therefore, needs to be compared with the description indicated by the key before the identification can be considered reliable.

1 Eyes very large, elliptic in outline, as in Text-figs. 5–6, 8–9. Hind tibiae deep brown to black with 2 broad, well defined, very pale bands in proximal third **C. extensipes** Karsch (p. 168)
– Eyes moderately large, sub-globose, as in Text-figs. 7, 10. Hind tibiae if brown or black then not with 2 pale bands in proximal third 2
2 Auricles present on internal side of tympanic organs : rudimentary to quite well developed (Text-figs. 12–13). (East Africa) . . . **C. aurita** sp. n. (p. 167)
– Tympanic auricles totally absent ; tympanic organs open on both sides (Text-fig. 11). (West and Central Africa) 3
3 Base of fore wings with no dark marking (Text-fig. 14) 4
– Base of fore wings with brown or black mark, sometimes small and inconspicuous, extending distad from region of second axillary sclerite (Text-figs. 15–17) . . 9



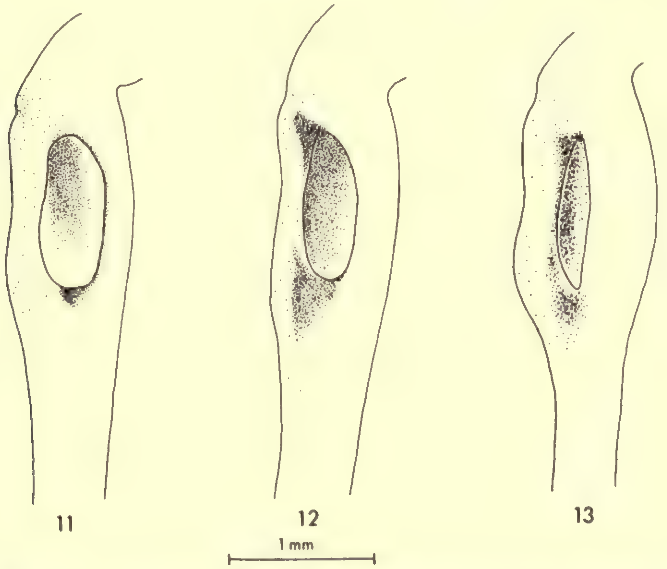
FIGS. 5–10. Left eye, 5–7 viewed from the side, 8–10 viewed at about 90° to the plane of insertion of the eye on the head ; 5, 8, *Catoptropteryx extensipes* Karsch (Cameroon) ; 6, 9, *C. extensipes* Karsch (Ghana) ; 7, 10, *C. apicalis* (Bolívar).

4 Lateral lobes of pronotum with no dark brown or black marking 5

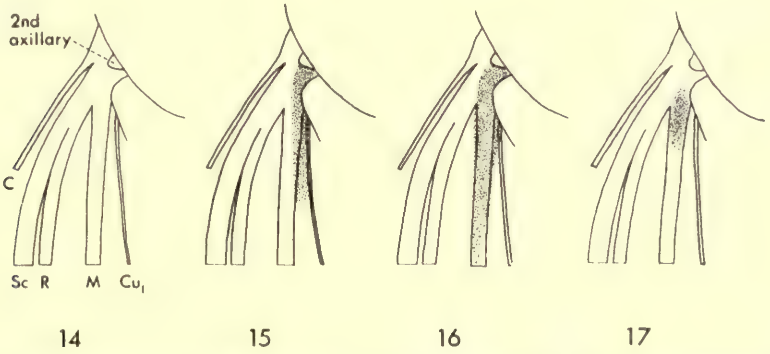
– Lateral lobes of pronotum dorsad with dark brown to black marking, from single small dark spot to broken or continuous longitudinal stria 6

5 Lateral lobes of pronotum as in Text-fig. 37, clearly higher than long. Apex of dorsal valves of ovipositor smooth (Text-fig. 54) ***C. nigrospinosa*** (Brunner) (p. 160)

– Lateral lobes of pronotum as in Text-fig. 42, not, or only very slightly, higher than long. Apex of dorsal valve of ovipositor with about 4 very small irregular teeth (Text-fig. 58) . . . . ***C. serrifera*** sp. n. (p. 165)



FIGS. 11–13. Right tympanic organ viewed from the internal side of the tibia of 11, *Catoptropteryx apicalis* (Bolívar) ; 12, *C. aurita* sp. n. (Mozambique) ; 13, *C. aurita* sp. n. (Zanzibar).

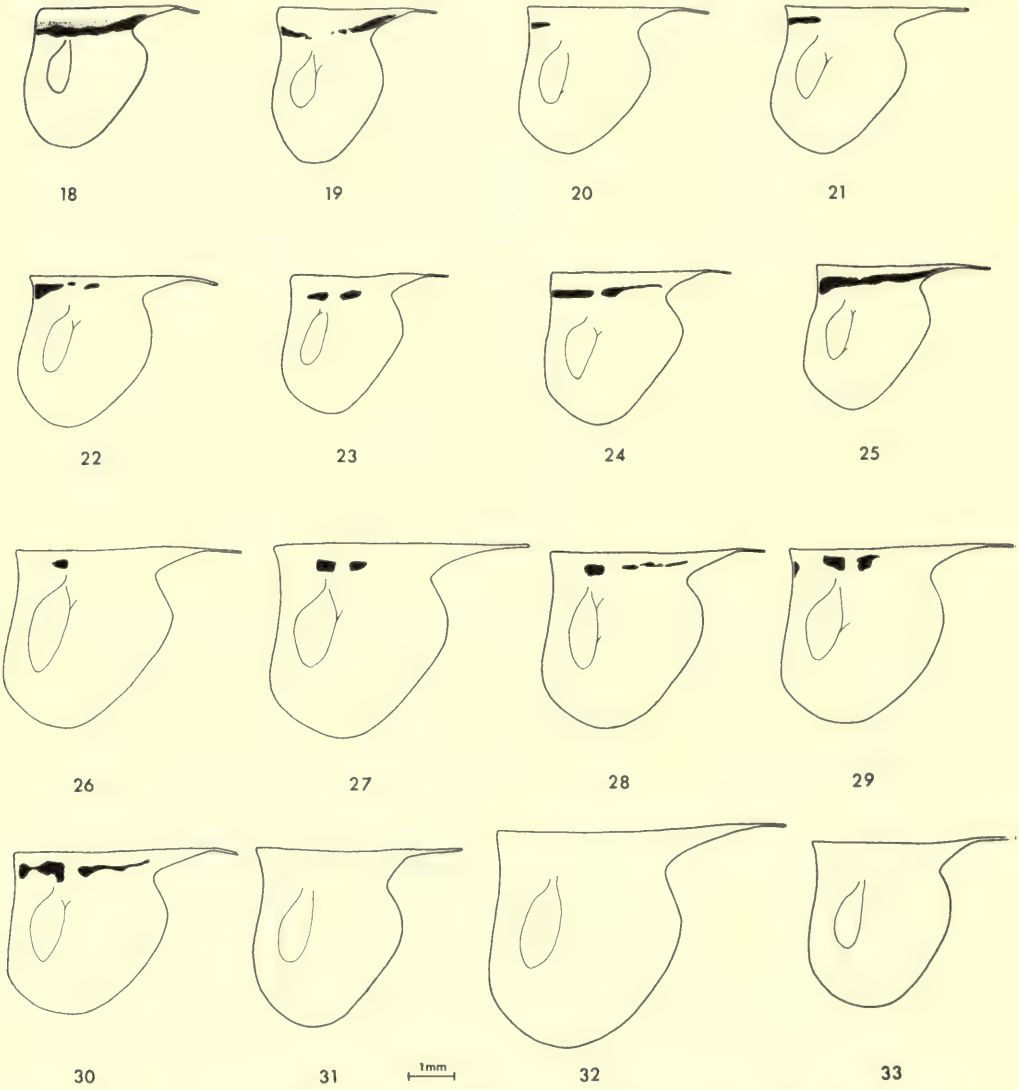


FIGS. 14–17. Diagram showing the types of coloration of the fore wing base of *Catoptropteryx* Karsch : dorsolateral view of left female fore wing of 14, *C. capreola* Karsch ; 15, *C. guttatipes* Karsch ; 16, *C. punctulata* (Karsch) ; 17, *C. afra* (Karsch).

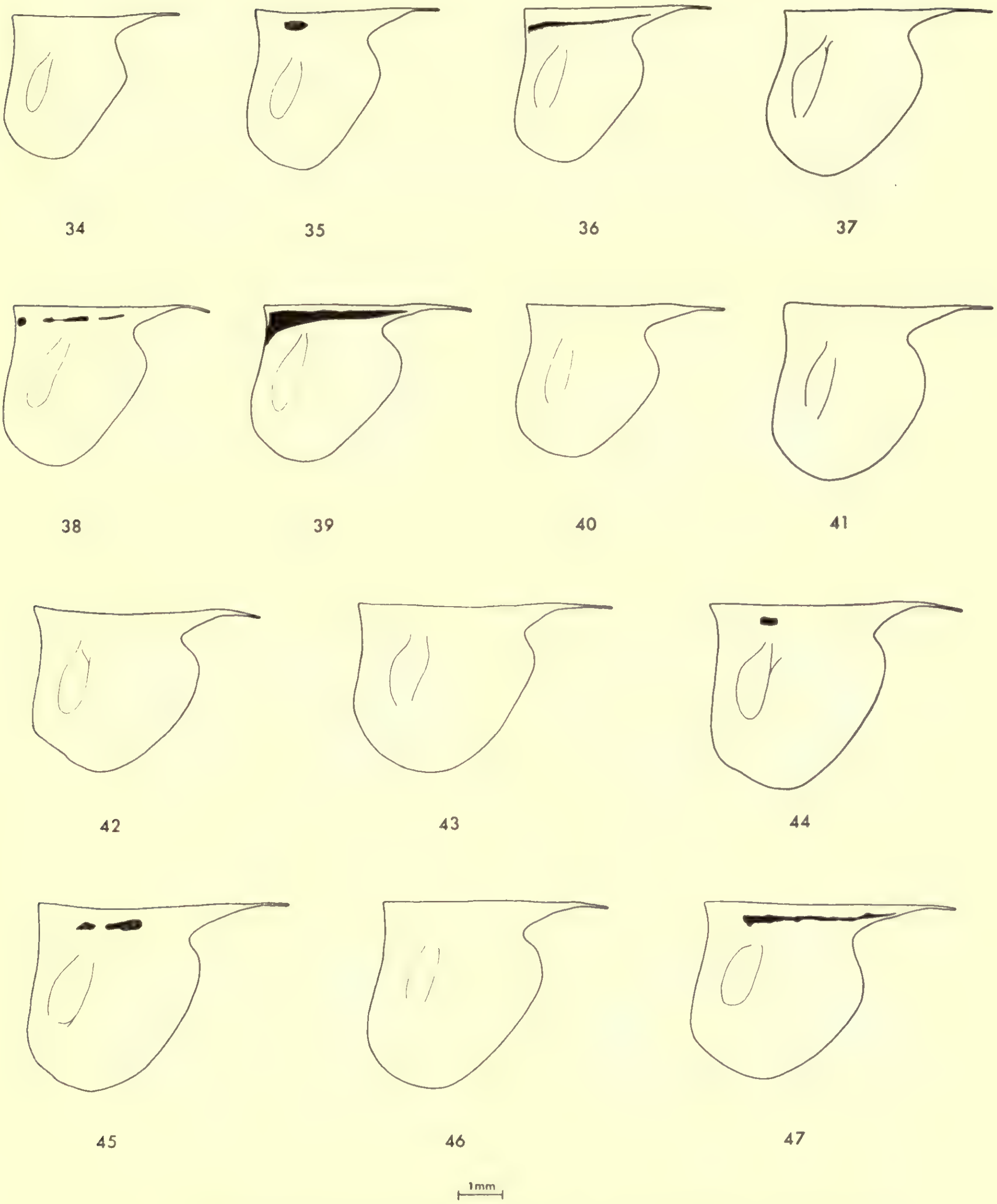
6 Venation of fore wings as in Text-figs. 60, 61 or 62 ; pattern of parallel veins in distal half of wing ; R_1 with more than 2 branches ; *MA* branched or unbranched 7

– Venation of fore wings as in Text-fig. 63 ; veins in distal half not parallel ; R_1 bifurcate ; *MA* unbranched 8

7 Venation of fore wings as in Text-fig. 60 ; *MA* bifurcate or unbranched ; R_s usually bifurcate. Area between pronotal disk and longitudinal stria of lateral lobe orange-yellow (Text-fig. 18) . . . . . ***C. nanus*** sp. n. (p. 147)



FIGS. 18–33. Lateral view of the pronotum of 18, *Catoptropteryx nanus* sp. n. ; 19, *C. ramulosa* sp. n. ; 20–25, *C. capreola* Karsch ; 26–30, *C. naevia* sp. n. ; 31, *C. apicalis* (Bolívar) ; 32, *C. afra* (Karsch) ; 33, *C. neutralipennis* Karsch.

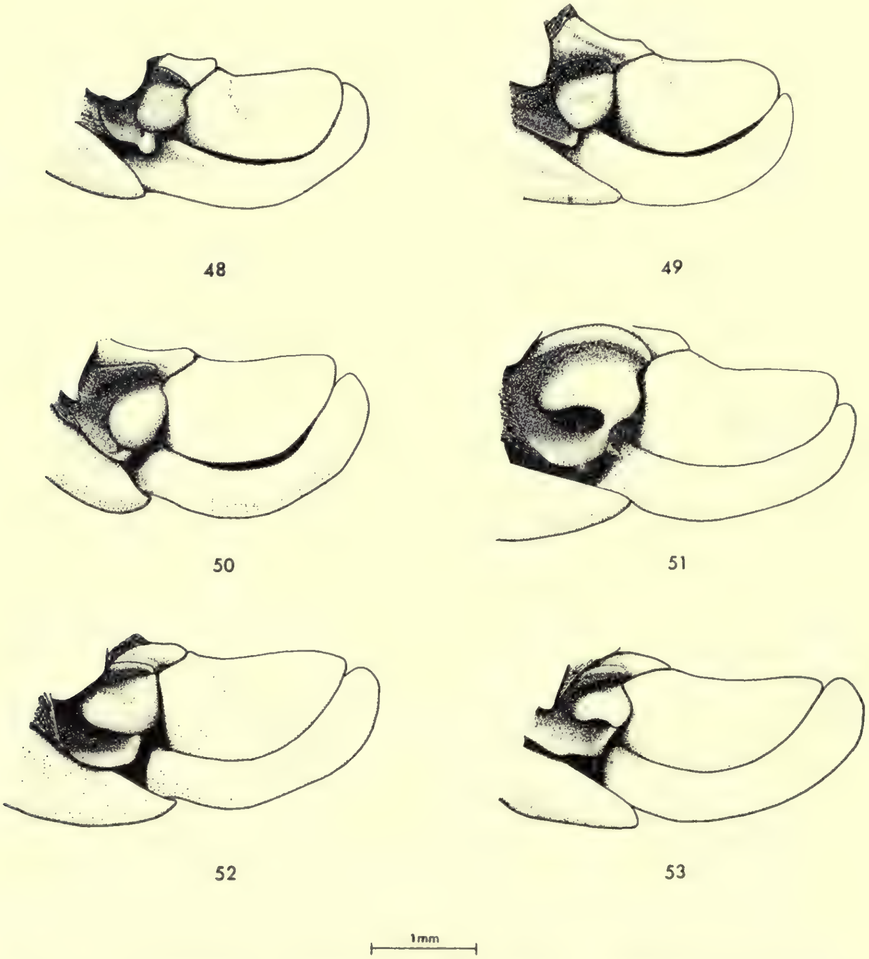

34
35
36
37
38
39
40
41
42
43
44
45
46
47
1mm

FIGS. 34–47. Lateral view of the pronotum of 34–36, *Catoptropteryx ambigua* sp. n. ; 37, *C. nigrospinosa* (Brunner) ; 38–39, *C. punctulata* (Karsch) ; 40, *C. guttatipes* Karsch ; 41, *C. occidentalis* sp. n. ; 42, *C. serrifera* sp. n. ; 43–45, *C. aurita* sp. n. ; 46, *C. extensipes* Karsch (Cameroon) ; 47, *C. extensipes* Karsch (Ghana).

– Venation of fore wings as in Text-figs. 61–62 ; *MA* with about 6 branches generated pectinately ; R_s with 3 branches. Lateral lobes of pronotum as in Text-fig. 19 ; cuticle same colour above stria as below . . . . ***C. ramulosa*** sp. n. (p. 148)

8 Coloration of pronotal lobes as in Text-figs. 20–25. External spinules of hind femora blackened only apically (Text-fig. 66). Stridulatory file with about 40–54 teeth. . . . . ***C. capreola*** Karsch (p. 151)

– Coloration of pronotal lobes as in Text-figs. 26–30. Some at least of external spinules of hind femora wholly black, and usually set in dark patches on femoral carina (Text-fig. 67). Stridulatory file with about 75–106 teeth. ***C. naevia*** sp. n. (p. 153)



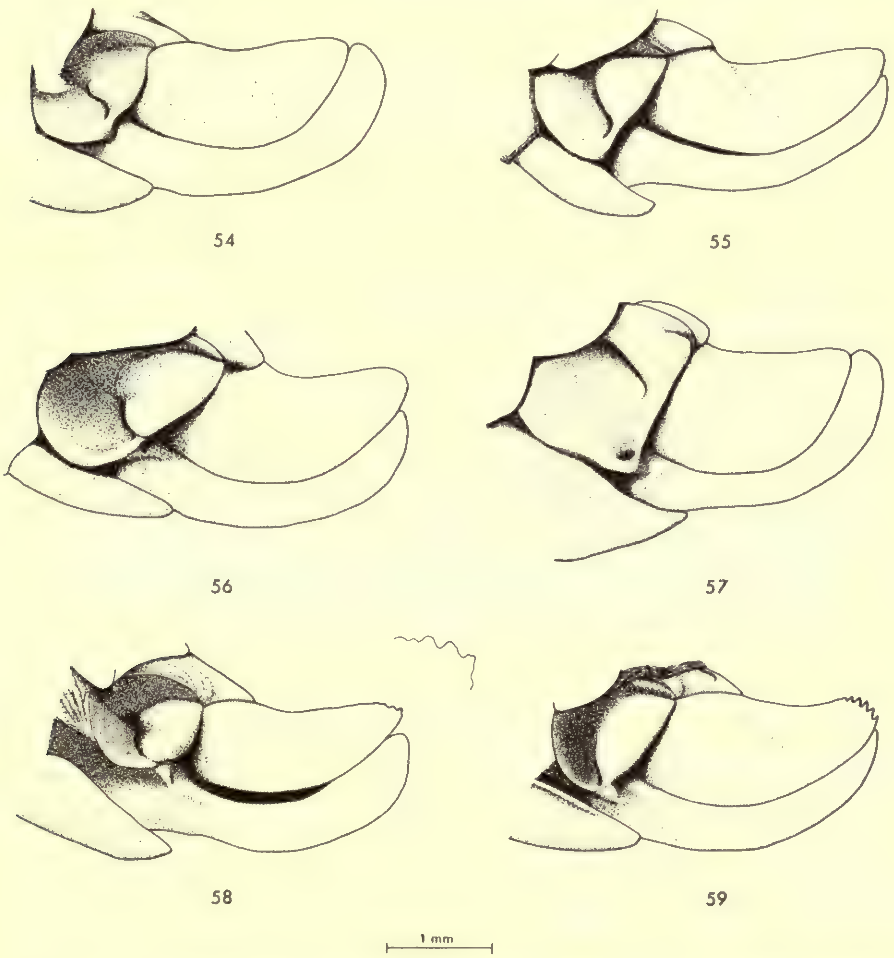
FIGS. 48–53. Lateral view of the ovipositor of 48, *Catoptropteryx ramulosa* sp. n. ; 49, *C. capreola* Karsch ; 50, *C. naevia* sp. n. ; 51, *C. apicalis* (Bolívar) ; 52, *C. neutralipennis* Karsch ; 53, *C. ambigua* sp. n.

9 Fore wings as in Text-fig. 64 ; scattered fuscous or fuscescent cells, isolated or in small groups, in areas R, R_1 or R_s. Cerci of ♂ depressed in apical half (Text-fig. 74). Stridulatory file as in Text-fig. 88, in posterior quarter abruptly sinuose with very closely spaced teeth. Valves of ovipositor unusually slender (Text-fig. 55) . . . . **C. punctulata** (Karsch) (p. 161)

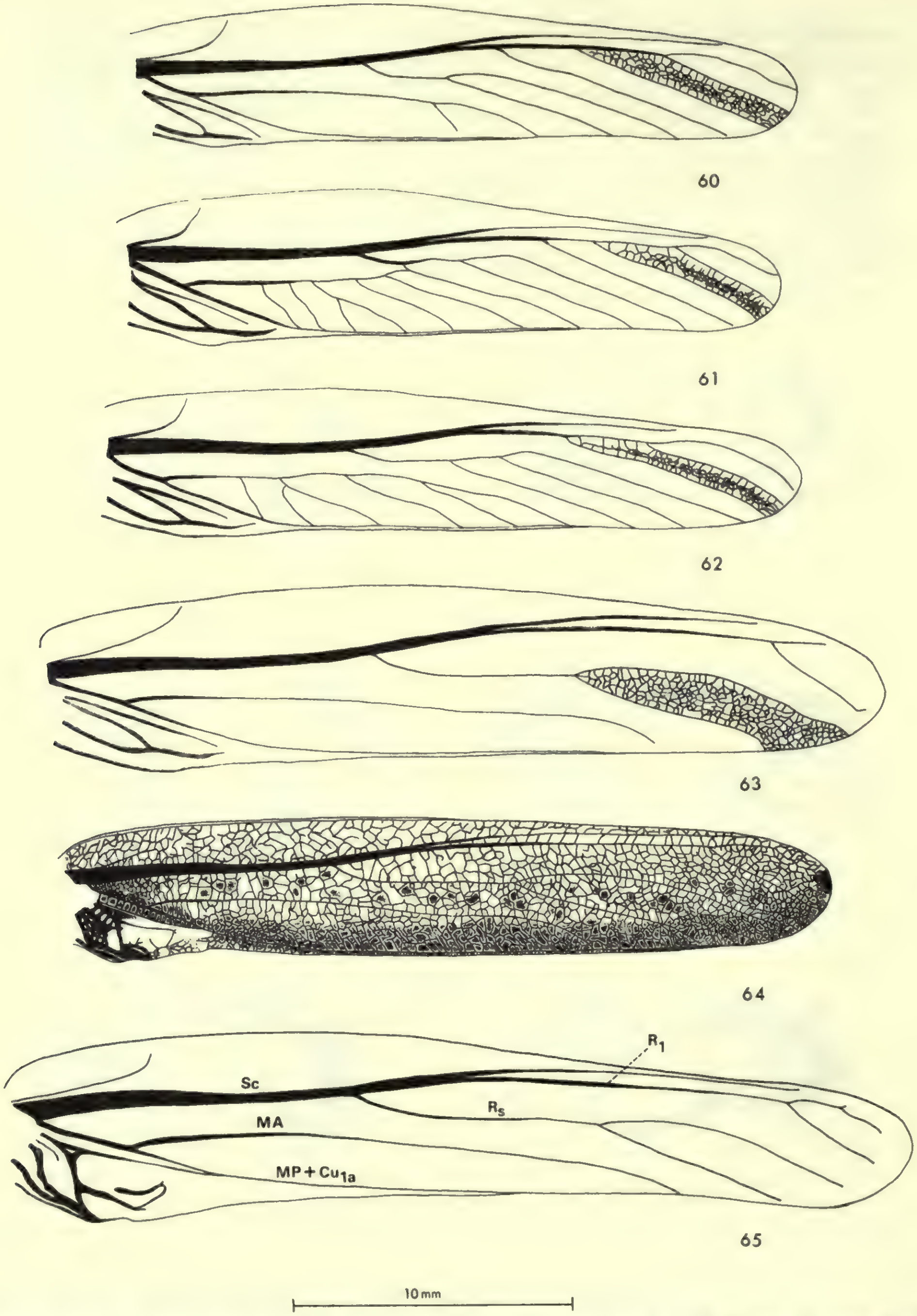
– Fore wings with no isolated dark cells in areas R, R_1 or R_s. Cerci of ♂ not depressed. Stridulatory file with no abrupt sinuosity. Valves of ovipositor not unusually slender 10

10 Basal mark of fore wings of type shown in Text-fig. 15 : black stripe runs distad from beneath second axillary sclerite into area M, not centred on M 11

– Basal mark of fore wings not as above 12



FIGS. 54–59. Lateral view of the ovipositor of 54, *Catoptropteryx nigrospinosa* (Brunner) ; 55, *C. punctulata* (Karsch) ; 56, *C. guttatipes* Karsch ; 57, *C. occidentalis* sp. n. ; 58, *C. serrifera* sp. n. (with view of apex of dorsal valve, ×35) ; 59, *C. aurita* sp. n.


60
61
62
63
64
R1
Sc
Rs
MA
MP + Cu1a
65
10 mm

FIGS. 60–65. Right fore wing of 60, *Catoptropteryx nanus* sp. n., ♀; 61–62, *C. ramulosa* sp. n., ♀; 63, *C. capreola* Karsch, ♀; 64, *C. punctulata* (Karsch), ♂; 65, *C. extensipes* Karsch, ♂.

11 Cerci of ♂ short, strongly sinuose viewed in plane of principal curvature (Text-fig. 75). Ovipositor as in Text-fig. 56 . . . . . . **C. guttatipes** Karsch (p. 163)

– Cerci of ♂ long and slender, moderately sinuose viewed in plane of principal curvature. Ovipositor as in Text-fig. 57 . . . . . **C. occidentalis** sp. n. (p. 164)

12 Basal mark of fore wings of type shown in Text-fig. 17 : proximally not extending as far as second axillary sclerite . . . . . . **C. afra** (Karsch) (p. 156)

– Basal mark of fore wings of type shown in Text-fig. 16 : black stripe runs distad from beneath second axillary sclerite along centre of M 13

13 Hind tibiae wholly dark brown to black ; hind tarsi black or very dark green. Cerci of ♂ black dorsally. Basal mechanism of ovipositor as in Text-fig. 53 **C. ambigua** sp. n. (p. 159)

– Hind tibiae green or yellow-brown. Cerci of ♂ red- or yellow-brown, not black dorsally. Basal mechanism of ovipositor as in Text-figs. 51–52 14

14 Cerci of ♂ asymmetrically inflated at apex (Text-fig. 71). Basal mechanism of ovipositor as in Text-fig. 51 : inferior margin of lobe of infragonangulum emarginate from lateral viewpoint . . . . . . **C. apicalis** (Bolívar) (p. 155)

– Cerci of ♂ not inflated at apex (Text-fig. 72). Basal mechanism of ovipositor as in Text-fig. 52 : inferior margin of lobe of infragonangulum not emarginate from lateral viewpoint. . . . . . . **C. neutralipennis** Karsch (p. 157)

DESCRIPTIONS OF THE SPECIES

Catoptropteryx nanus sp. n.

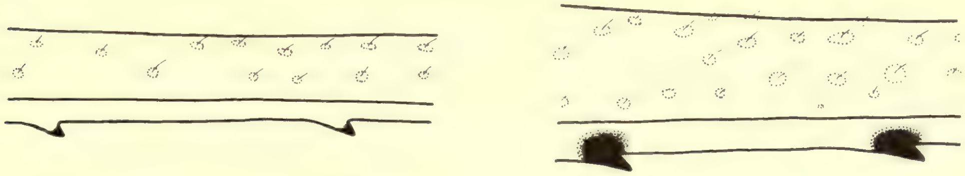
(Text-figs. 1, 18, 60, 68, 82)

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 18 ; height clearly exceeding length. Fore wings as in Text-fig. 60 ; R_1 with about 4 branches arranged pectinately ; R_s usually bifurcate ; branches of R_1 and R_s straight and parallel, archedictyon between them denser and with smaller cells along centre of each area ; MA bifurcate or unbranched. Stridulatory file as in Text-fig. 82, narrow, almost straight, teeth closely spaced. Tympanic organs without auricles.

Cerci as in Text-fig. 68 ; short, arcuate, circular in transverse section, almost straight viewed in plane of principal curvature ; apex acute, bearing spinule.

Sides of thorax, and often external surface of hind femora in proximal half, whitish (probably white in living insect). Lateral lobes of pronotum whitish, with longitudinal black stria, usually unbroken, dorsad ; area between black stria and disk orange-yellow. Fore wings without basal or apical markings ; membrane blackened only in cells adjacent to $MP + Cu_{1a}$; inconspicuous striped pattern generated by venation of distal half of wings. Hind wings hyaline except for apical archedictyon. External spinules of hind femora blackened only apically.



66 67

FIGS. 66–67. Lateral view of part of the left hind femur of 66, *C. capreola* Karsch ; 67, *C. naevia* sp. n.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor very similar to that of *C. ramulosa* sp. n. (Text-fig. 48), but posterior angle of infragonangulum more rounded and obtuse, and supragonangulum somewhat less salient dorsad ; apical margin of dorsal valves smooth.

	Males	Females
Number of specimens examined :	26	25
Total length :	29·1–30·7	32·8–35·0
Median length of pronotum :	3·2–3·6	3·4–3·9
Length of hind femur :	15·1–17·2	16·3–18·0
Length of fore wing :	20·0–21·9	23·2–25·5
Stridulatory file—		
number examined :	15	
number of teeth (T) :	76–110	
length (replica) (F) :	1·43–1·75	
T/F :	53·1–71·0	

C. nanus sp. n. is very closely related to *C. ramulosa* sp. n., from which it can be distinguished by the venation of the fore wings and the coloration of the pronotum ; the striped pattern of the fore wings is much less marked than in the latter species. The relation between tooth number and file length is distinctive (see Text-fig. 1), though whether it differs significantly from that in *C. ramulosa* sp. n. is not yet known.

The species is known only from Cameroon.

Holotype ♀. CAMEROON : Efulen, 15.i.1923 (*Weber*) (ANS Philadelphia).

Paratypes. CAMEROON : ———, 1898–1899 (*Conradt*) 1 ♂ (IEE Madrid) ; Efulen, 17.xi.1920 (*Weber*) 1 ♂ (BMNH), 2.vii.1922 (*Weber*) 1 ♂ (BMNH), 24.x.1922 (*Weber*) 1 ♂ (ANS Philadelphia), 1 ♀ (BMNH), 10–21.xi.1922 (*Weber*) 1 ♂, 1 ♀ (BMNH), 4 ♂, 2 ♀ (ANS Philadelphia), xii.1922 (*Weber*) 3 ♂, 3 ♀ (BMNH), 6 ♂, 9 ♀ (ANS Philadelphia), i.1923 (*Weber*) 1 ♂, 1 ♀ (BMNH), 3 ♂, 3 ♀ (ANS Philadelphia), 10.ii.1923 (*Weber*) 1 ♀ (BMNH), 1 ♂, 2 ♀ (ANS Philadelphia), 12–22.iii.1923 (*Weber*) 1 ♀ (BMNH), 1 ♂ (ANS Philadelphia), iv.1923 (*Weber*) 1 ♂ (ANS Philadelphia), 5.iv.1923 (*Weber*) 1 ♂ (BMNH).

***Catoptropteryx ramulosa* sp. n.**

(Text-figs. 19, 48, 61–62)

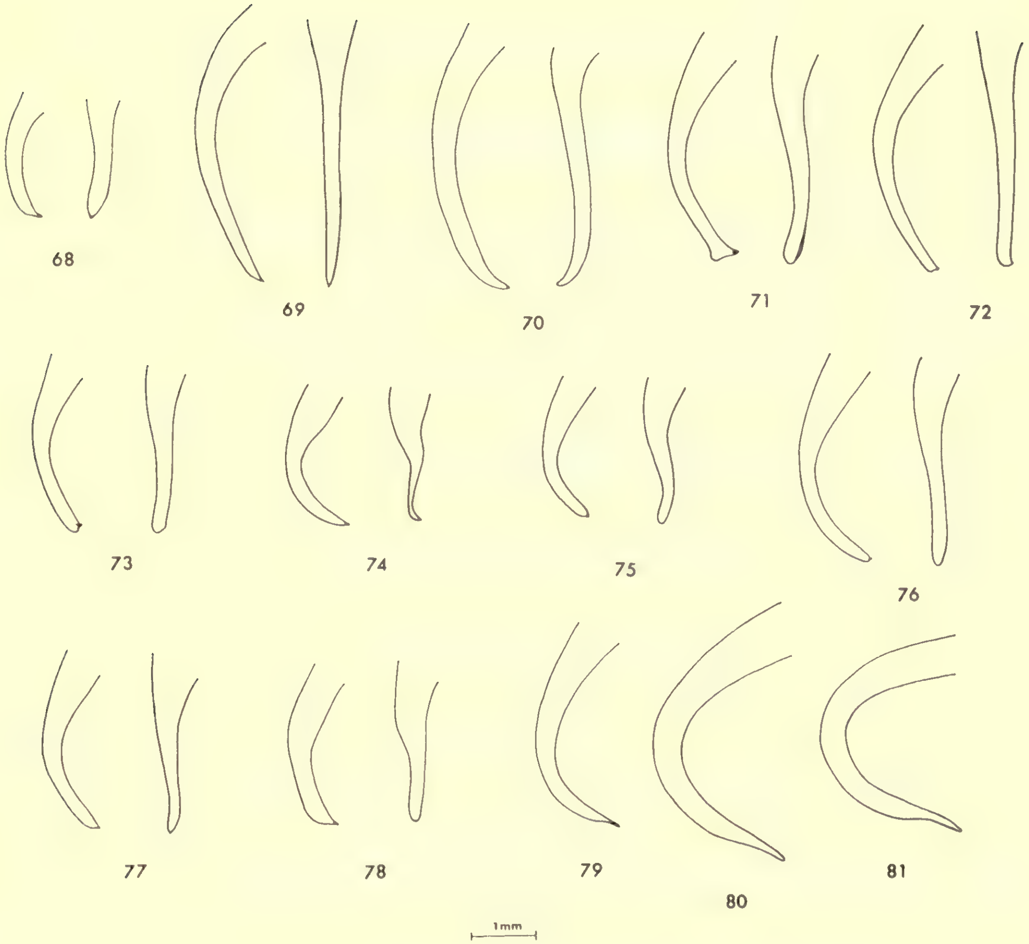
♂. Not known.

♀. Eyes moderately large, sub-globose, strongly prominent.

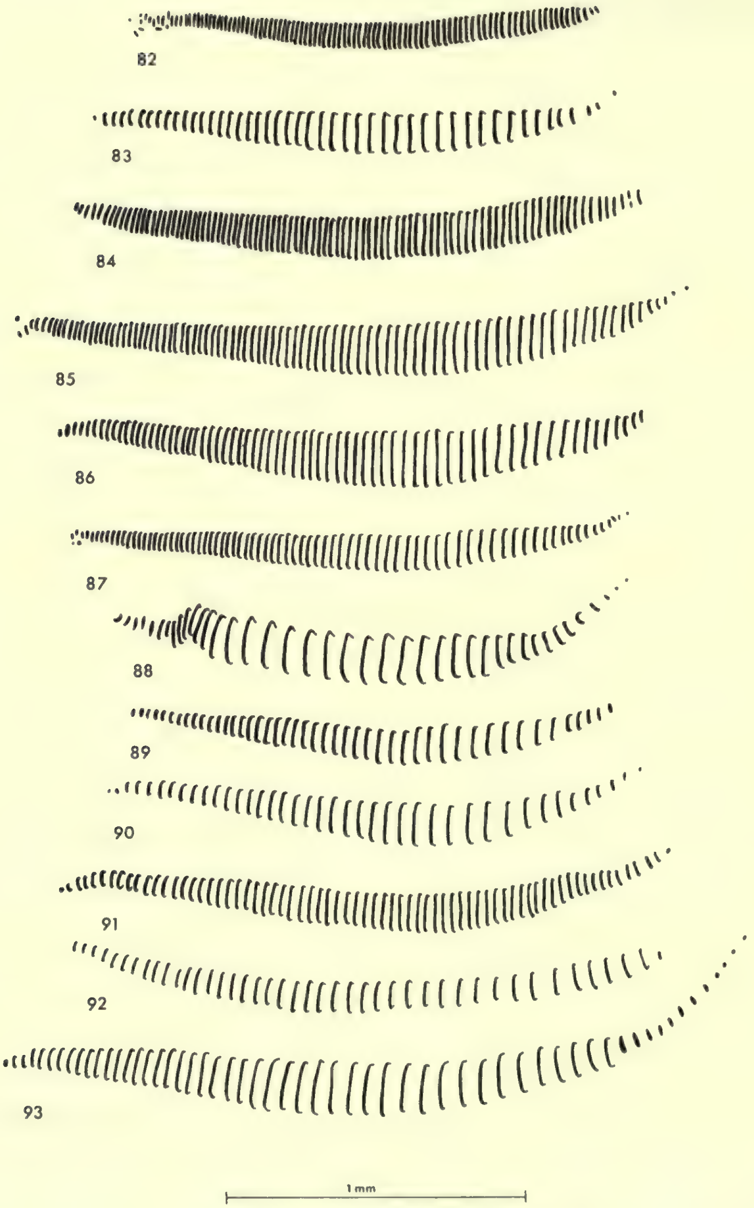
Lateral lobes of pronotum as in Text-fig. 19 ; height clearly exceeding length. Fore wings as in Text-figs. 61 and 62 ; branches of R_1, R_s and MA generated pectinately, sub-parallel, archedictyon between them denser and with much smaller cells along centre of each area ; R_1 with 3 or 4 branches, R_s with 3 branches, MA with about 6 branches. Tympanic organs without auricles.

Ovipositor as in Text-fig. 48, posterior angle of infragonangulum only slightly greater than 90° ; apical margin of dorsal valves smooth.

Sides of thorax pale green to ivory. Lateral lobes of pronotum not whitish, with somewhat variable broken black stria dorsad ; cuticle same colour above stria as below. Fore wings



Figs. 68–81. Left male cercus viewed (left) from above, at 90° to its plane of principal curvature, and (right) from the outside, in the plane of principal curvature : 68, *Catoptropteryx nanus* sp. n. ; 69, *C. capreola* Karsch ; 70, *C. naevia* sp. n. ; 71, *C. apicalis* (Bolívar) ; 72, *C. neutralipennis* Karsch ; 73, *C. ambigua* sp. n. ; 74, *C. punctulata* (Karsch) ; 75, *C. guttatipes* Karsch ; 76, *C. occidentalis* sp. n. ; 77, *C. serrifera* sp. n. ; 78, *C. aurita* sp. n. ; 79, *C. extensipes* Karsch (Cameroon) ; 80, *C. extensipes* Karsch (Ivory Coast) ; 81, *C. extensipes* Karsch (Ghana).



FIGS. 82–93. Left stridulatory file of 82, *Catoptropteryx nanus* sp. n. ; 83, *C. capreola* Karsch ; 84, *C. naevia* sp. n. ; 85, *C. apicalis* (Bolívar) ; 86, *C. neutralipennis* Karsch ; 87, *C. ambigua* sp. n. ; 88, *C. punctulata* (Karsch) ; 89, *C. guttatipes* Karsch ; 90, *C. occidentalis* sp. n. ; 91, *C. serrifera* sp. n. ; 92, *C. aurita* sp. n. ; 93, *C. extensipes* Karsch. The posterior end of the file is to the left in the drawings.

without basal or apical markings ; membrane blackened only in cells adjacent to $MP + Cu_{1a}$; striped pattern generated by venation, particularly marked in distal half of wings. Hind wings hyaline except for apical archedictyon. External spinules of hind femora blackened only apically.

	Females
Number of specimens examined :	2
Total length :	33·0–35·0
Median length of pronotum :	3·5–3·6
Length of hind femur :	17·3–17·8
Length of fore wing :	23·8–25·5

C. ramulosa sp. n. is very closely related to *C. nanus* sp. n., from which it can be readily distinguished by the many-branched MA, pectinate R_s and more conspicuous pattern of the archedictyon of the fore wings, and by the coloration of the pronotal lobes. *C. nanus* sp. n. and *C. ramulosa* sp. n. may possibly be shown by the evidence of further material to be geographic variants of the same species. However, in the absence of unequivocal evidence in this direction at the present, and since the two forms are clearly delimited in the available material, I prefer to treat them here as separate species rather than give them subspecific status.

C. ramulosa sp. n. is known only from eastern Congo (Kinshasa).

Holotype ♀. CAMEROON : 39 km S. of Walikale, 700 m, 25.xii.1957 (*Ross & Leech*) (CAS San Francisco).

Paratype ♀. CAMEROON : 39 km S. of Walikale, 700 m, 14.ix.1957 (*Ross & Leech*) (BMNH).

Catoptropteryx capreola Karsch

(Text-figs. 1, 14, 20–25, 49, 63, 66, 69, 83)

Catoptropteryx capreola Karsch, 1896 : 332. Holotype ♂, CAMEROON : Lolodorf (ZMHU Berlin) [examined].

Catoptropteryx immaculipennis Karsch, 1896 : 333. Holotype ♂, CAMEROON : Lolodorf (ZMHU Berlin) [examined]. **Syn. n.**

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-figs. 20–25 ; height clearly exceeding length. R_s of fore wings with 2 or rarely more branches as in Text-fig. 63; R_1 bifurcate ; MA unbranched. Stridulatory file as in Text-fig. 83, broad, straight, teeth widely spaced. Tympanic organs without auricles.

Cerci as in Text-fig. 69 ; long and slender, circular in transverse section, arcuate, not or only very slightly sinuose viewed in plane of principal curvature ; apex acute, bearing small spinule ; length somewhat variable.

Lateral lobes of pronotum dorsad with longitudinal dark brown to black stria continuous or broken and of variable length : most common variants as in Text-figs. 20–22, 24–25 ; Text-fig. 23 illustrates rarer pattern. Fore wings without dark markings at base or apex ; membrane usually blackened for variable distance on either side of $MP + Cu_{1a}$, and occasionally over whole of cubito-anal area, but without isolated dark cells in areas R, R_1 or R_s. Hind wings hyaline except for apical archedictyon. External spinules of hind femora blackened only apically, as in Text-fig. 66, and not set in dark patches on femoral carina ; hind femora with numerous brown spots in distal half. Cerci, epiproct and parts of tenth abdominal tergite often red-brown or dark brown.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 49 ; apical margin of dorsal valves smooth ; infragonangulum large, inflated, usually somewhat flattened dorsolaterally.

	Males	Females
Number of specimens examined :	184	100
Total length :	31·5–39·5	34·8–40·8
Median length of pronotum :	3·6–4·5	3·9–4·9
Length of hind femur :	15·9–21·5	17·5–20·4
Length of fore wing :	23·2–30·5	25·1–30·4
Stridulatory file—		
number examined :	17	
number of teeth (T) :	40–54	
length (replica) (F) :	1·46–1·84	
T/F :	27·4–34·4	

C. capreola Karsch has a very strong affinity with *C. naevia* sp. n., from which it is most reliably distinguished by the coloration of the external spinules of the hind femora. It also differs from that species in the coloration of the pronotal lobes, the shape of the male cerci viewed in their plane of principal curvature, and the number and distribution of teeth in the stridulatory file (see Text-fig. 1). The differences between the two species in the gonangulum of the ovipositor are not always as clear as in the specimens figured here, being of a similar magnitude to intraspecific variation and variation in distortion through drying.

The known range of *C. capreola* Karsch extends across West and Central Africa from western Liberia to Uganda and northern Angola.

Holotype ♂. CAMEROON : Lolodorf (*Conradt*) (ZMHU Berlin).

GUINEA : N.E. end Nimba Range, 4 mls N.W. of Nzo, vii.1963, 1 ♀ ; Nimba, Ziéla, ii.1957, 1 ♂, iii.1957, 3 ♂ ; Nimba, vii–xii.1951, 1 ♂. LIBERIA : Marshall Territory, iii.1955, 1 ♀, iv.1955, 1 ♀, v.1955, 2 ♂, 1 ♀, vi.1955, 3 ♂, 1 ♀, ii.1956, 1 ♀, iv.1956, 1 ♂, x.1956, 1 ♀, xii.1956, 1 ♂, iv.1957, 1 ♂ ; N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Reserve Rest House, vii.1963, 3 ♂, 4 ♀. IVORY COAST : Adiopodoumé, ii.1955, 1 ♂, ix.1963, 1 ♂, x.1963, 1 ♂, vii.1965, 1 ♂, viii.1965, 1 ♂, ix.1965, 2 ♀, x.1965, 1 ♂, xi.1965, 1 ♀ ; Toumodi, Lamto, i.1952, 1 ♀, iv.1964, 8 ♂, 6 ♀, x.1966, 1 ♂, xii.1966, 2 ♂ ; Tai, i.1955, 1 ♀ ; Grabo, i.1955, 1 ♂ ; Nimba, Yalé, 380 m, iv.1964, 1 ♂ ; Forêt du Banco, x.1963, 18 ♂, 10 ♀ ; Réserve du Banco, 5 ♂, 1 ♀. GHANA : Tafo, xi.1961, 8 ♂, 3 ♀, xii.1961, 5 ♂, ii.1962, 3 ♂, iii.1962, 2 ♂, 1 ♀, iv.1957, 3 ♂, 8 ♀, v.1957, 8 ♀, vi.1957, 1 ♂, 3 ♀, v–vi.1954, 5 ♂, 2 ♀ ; W. Region, nr. Wiawso, 30 mls N.W. of Tano Lodge, x.1960, 5 ♂ ; Ashanti Region, nr. Kubease, Bobiri Forest Res., x.1960, 1 ♂, Ashanti Region, Bobiri Forest Res., 23 mls S.E. of Kumasi, xi.1959, 1 ♂ ; Ashanti Region, Bekwai Dist., Numia Forest Res., N. of Prasu R. Bridge, vii.1962, 1 ♂. NIGERIA : W. Prov. 11 mls E. of Ondo, Owenna Forest Rest Ho., xii.1960, 3 ♂, 1 ♀ ; W. Prov. University Coll. Ibadan, xii.1960, 1 ♀ ; E. Prov., 20 mls N.E. of Calabar, Forest Res., i.1961, 1 ♂ ; W. Prov., 24 mls S. of Benin, Sapoba Forestry Sta., i.1961, 1 ♂ ; nr. Ibadan, Gombar, i.1965, 5 ♂, 1 ♀. CAMEROON : Lolodorf (*Conradt*) 1 ♂ (ZMHU) Berlin (holotype of *Catoptropteryx immaculipennis* Karsch) ; Efulen, xi.1920, 1 ♂, vii.1922, 1 ♀, x.1922, 3 ♂, xi.1922, 14 ♂, 7 ♀, xii.1922, 12 ♂, 3 ♀, i.1923, 4 ♂, 1 ♀, ii.1923, 1 ♀, iii.1923, 6 ♂, 4 ♀, iv.1923, 1 ♂, 1 ♀ ; Kribi, 1908, 1 ♂, 1 ♀ ; Etandac, xi.1922, 1 ♂ ; Abong Mbang, x.1946, 1 ♂ ; Ja R., Bitye, 1 ♂ ; Victoria, 1 ♂ ; Kumba, vi.1959, 1 ♂ ; ————, 1950, 1 ♂ ; Mt. Cameroon, Post & Telegraph Road, 55 ft, xii.1960, 1 ♀ ; ————, 1898–1899, 1 ♀. FERNANDO PÓO : Basilé, i.1933, 1 ♂. CENTRAL AFRICAN REPUBLIC : Fort Sibut, 1375 ft, x.1934, 1 ♂. CONGO (BRAZZAVILLE) : M'boko Sogho, 1 ♀ ; Sanga R., Nola, 1300 ft, x.1934, 1 ♂, 2 ♀ ; Mayumbe, Dimonika, i.1964, 1 ♂ ; Mts. du Chaillu, Mbila, xii.1963, 4 ♂. CONGO (KINSHASA) : 39 km S. of Walikale, 700 m, ix.1957, 1 ♂, xii.1957, 1 ♂, 2 ♀ ; Ubangi, Budjalibala, ii.1949, 1 ♂ ; Région des Lacs, 1 ♂, 1 ♀ ; Flandria, xii.1930, 1 ♀ ; Equateur, Boende, vi.1926, 1 ♂ ; Equateur, Bokuma, 1951, 1 ♂ ; Idiofa, Mwilambongo, 1947, 1 ♀ ; Boma-Yanga, x.1912, 1 ♀ ; Hte Tshuapa, Skela, 1936, 1 ♀ ; Bas Congo, Luki, vi–vii.1952, 1 ♂ ; Avakubi, x.1912, 1 ♂ ; Kivu, Costermansville, 1951, 1 ♀ ; W. Kivu, Walungu, 1939, 1 ♂ ; Eala, iv–v.1932, 1 ♀ ; Kibali-Ituri Dist., 10 mls W. Epulu R. Ferry, Irumu-Avakubi Rd., Saidi, 2800 ft, ix.1934, 3 ♂, 1 ♀ ; Kibali–Ituri Dist., betw. Mambasa & Saidi, Epulu R. Ferry, 2500 ft, ix.1934, 2 ♂ ; Medje, 2°25′ N., 27°15′ E., viii.1910, 1 ♂. UGANDA : ————, 1 ♂, 1 ♀ ; Zika Forest, viii.1963, 2 ♂, x.1963, 1 ♂ ; Zika Forest, 7 mls from Entebbe, 40 ft level, iii–vi.1961, 1 ♂, 80 ft level, iii–vi.1961, 1 ♂, vii.1961, 1 ♂ ; Entebbe, x.1914, 1 ♀ ; Mfanga Forest Res., viii.1964, 1 ♀. ANGOLA : Congulu, iv.1934, 1 ♂, 1 ♀.

Catoptropteryx naevia sp. n.

(Text-figs. 1, 26–30, 50, 67, 70, 84)

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-figs. 26–30 ; height clearly exceeding length. R_s of fore wings with 2 or rarely more branches as in Text-fig. 63 ; R_1 bifurcate ; *MA* unbranched. Stridulatory file as in Text-fig. 84, broad, slightly curved, teeth closely spaced. Tympanic organs without auricles.

Cerci as in Text-fig. 70 ; long and slender, circular in transverse section, arcuate, more or less strongly sinuose viewed in plane of principal curvature ; apex acute, bearing small spinule ; length somewhat variable.

Lateral lobes of pronotum as in Text-fig. 26, with single black spot dorsad in anterior half ; less commonly with additional dark brown to black markings in longitudinal line as in Text-figs. 27–28, and rarely as in Text-figs. 29–30, but spot corresponding in position to that in commonest variant always most conspicuous of pronotal markings. Fore wings without dark markings at base ; membrane usually blackened for variable distance on either side of $MP + Cu_{1a}$, but without isolated dark cells in areas R, R_1 or R_s ; small fuscous spot occasionally present at apex. Hind wings hyaline except for apical archedictyon. Some at least of external spinules of hind femora wholly black and usually set in dark brown to black patches on femoral carina, as in Text-fig. 67 ; hind femora with numerous brown spots in distal half. Cerci, epiproct and parts of tenth abdominal tergite often red-brown or dark-brown.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 50 ; apical margin of dorsal valves smooth ; infragonangulum large, inflated, usually roughly prolate-spheroidal.

	Males	Females
Number of specimens examined :	117	32
Total length :	37·5–44·2	37·5–45·5
Median length of pronotum :	4·5–5·6	4·4–5·4
Length of hind femur :	20·1–23·2	19·1–23·5
Length of fore wing :	28·6–34·3	27·9–33·6
Stridulatory file—		
number examined :	15	
number of teeth (T) :	75–106	
length (replica) (F) :	1·66–2·18	
T/F :	39·5–54·7	

This species is very similar to *C. capreola* Karsch, from which, however, it shows a consistent distinction in the coloration of the external spinules of the hind femora, and also in the number and distribution of teeth in the stridulatory file (see Text-fig. 1). Other real though perhaps less clear-cut differences exist in the coloration of the pronotal lobes and the shape of the male cerci. The infragonangulum of the ovipositor tends to be more inflated than in *C. capreola* Karsch, but this is a rather subtle distinction that may be masked by the distortion of the basal sclerites due to drying. Although there is an overlap of the ranges of all the dimensions measured, *C. naevia* sp. n. is appreciably larger on average than *C. capreola* Karsch.

C. naevia sp. n. is distributed in West Africa from Sierra Leone to Ghana.

Holotype ♂. LIBERIA : Marshall Territory, 30.vii.1955 (*Fox*) (ANS Philadelphia).

Paratypes. GUINEA : Forest de Diéké, 20 mls N. of Diéké, 24.vii.1963 (*Jago*) 1 ♂ (BMNH) ; Nimba, Ziéla, 25.v.1957 (*Lamotte, Amiet & Vanderplaetsen*) 1 ♂ (MNHN Paris). SIERRA LEONE : Kenema, 31.iii.1946 (*Jordan*) 1 ♂ (BMNH) ; Njala, 18.iv.1929 (*Hargreaves*) 1 ♀ (BMNH). LIBERIA : Marshall Territory, 27.xi. 1954 (*Fox*) 1 ♀ (BMNH), 27.xii.1954 (*Fox*) 1 ♀ (BMNH), 17–28.i.1955 (*Fox*) 1 ♂, 1 ♀ (BMNH), 3 ♂, 1 ♀ (ANS Philadelphia), 12–16.ii.1955 (*Fox*) 1 ♂ (BMNH), 2 ♂, 1 ♀ (ANS Philadelphia), 1–28.iii.1955 (*Fox*) 2 ♂ (BMNH), 8 ♂ (ANS Philadelphia), 19–27.iv.1955 (*Fox*) 1 ♂ (BMNH), 3 ♂ (ANS Philadelphia), 17.v.1955 (*Fox*) 1 ♂ (BMNH), 16–27.vi.1955 (*Fox*) 2 ♂ (BMNH), 3 ♂ (ANS Philadelphia), 2–30.vii.1955 (*Fox*) 2 ♂ (BMNH), 6 ♂, 1 ♀ (ANS Philadelphia), 20–28.viii.1955 (*Fox*) 1 ♂ (BMNH), 2 ♂ (ANS Philadelphia), 6–22.ix.1955 (*Fox*) 1 ♂, 1 ♀ (BMNH), 1 ♂ (ANS Philadelphia), 11–23.x.1955 (*Fox*) 1 ♂ 1 ♀ (BMNH), 4 ♂ (ANS Philadelphia), 5–16.xi.1955 (*Fox*) 1 ♂ (BMNH), 1 ♂ ,1 ♀ (ANS Philadelphia), 4–25.xii.1955 (*Fox*) 1 ♂ (BMNH), 2 ♂, 2 ♀ (ANS Philadelphia), 4–17.i.1956 (*Fox*) 1 ♂ (BMNH), 3 ♂, 1 ♀ (ANS Philadelphia), 1–18.ii.1956 (*Fox*) 2 ♂, 1 ♀ (BMNH), 6 ♂, 2 ♀ (ANS Philadelphia), 15.iii.1956 (*Fox*) 1 ♂ (BMNH), 4–25.iv.1956 (*Fox*) 1 ♂ (BMNH), 4 ♂ (ANS Philadelphia), 3–19.v.1956 (*Fox*) 1 ♂ (BMNH), 1 ♂, 1 ♀ (ANS Philadelphia), 1.vii.1956 (*Fox*) 1 ♀ (ANS Philadelphia), 28–31.x.1956 (*Fox*) 1 ♂ (BMNH), 2 ♂ (ANS Philadelphia), 7.xi.1956 (*Fox*) 1 ♂ (BMNH), 1 ♂ (ANS Philadelphia), 15.xii.1956 (*Fox*) 1 ♀ (ANS Philadelphia), 6–31.i.1957 (*Fox*) 1 ♂ (BMNH), 2 ♂ (ANS Philadelphia), 3–28.ii.1957 (*Fox*) 1 ♂ (BMNH), 2 ♂ (ANS Philadelphia), 19–21.iii.1957 (*Fox*) 1 ♂ (BMNH), 1 ♂ (ANS Philadelphia), 8.iv.1957 (*Fox*) 1 ♂ (BMNH), 1–20.v.1957 (*Fox*) 1 ♂ (BMNH), 1 ♂ (ANS Philadelphia) ; N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Res.

Rest Ho., 23.vii.1963 (*Jago*) 4 ♂, 2 ♀ (BMNH) ; Bindah, forest edge, 6.iv.1920 (*Barrett*) 1 ♂ (BMNH). IVORY COAST : Adiopodoumé, 24.iii.1890 (*Vuillaume*) 1 ♀ (ORSTOM Abidjan) ; Forêt du Banco, 15.x.1963, 1 ♂ (BMNH), 1 ♂ (ORSTOM Abidjan), 12.v.1964, 1 ♂ (ORSTOM Abidjan). GHANA : Tafo, 2–30.xi.1961 (*Gardner*) 3 ♂, 1 ♀ (BMNH), 1–26.xii.1961 (*Gardner*) 1 ♂, 2 ♀ (BMNH), 1–29.i.1962 (*Gardner*) 1 ♂, 2 ♀ (BMNH), 3–25.ii.1962 (*Gardner*) 2 ♂, 3 ♀ (BMNH), 3.iii.1962 (*Gardner*) 1 ♀ (BMNH), 19.iv.1957 (*Eastop*) 1 ♀ (BMNH), 31.v.1957 (*Eastop*) 1 ♂ (BMNH), 7–21.vi.1957 (*Eastop*) 2 ♂ (BMNH), v–vi.1954 (*Williams*) 5 ♂ (BMNH) ; Ashanti, Bobiri Forest Res., 23 mls S.E. of Kumasi, 21.xi.1959 (*Jago*) 1 ♀ (UG Accra) ; E. Region, Kade Agr. Res. Sta., 9.vii.1963 (*Acheampong*) 1 ♂ (UG Accra) ; E. Region, Tafo, W.A.C.R.I., x.1961 (*Jago*) 1 ♂ (UG Accra). GHANA ? : Fantee Country, Bosso (*Jones*) 1 ♂ (BMNH).

Catoptropteryx apicalis (Bolívar)

(Text-figs. 1, 7, 10–11, 31, 51, 71, 85. Plate 1, fig. 2)

Caedicia apicalis I. Bolívar, 1893 : 177. Holotype ♀, IVORY COAST : Assinie (IEE Madrid) [examined].

Catoptropteryx signatipennis Karsch, 1896 : 333. Lectotype ♂, CAMEROON : Victoria (ZMHU Berlin) [examined]. **Syn. n.**

Catoptropteryx apicalis (Bolívar) Kirby, 1906 : 416.

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 31 ; height clearly exceeding length. R_s of fore wings as in Text-fig. 63, with 2 or rarely 3 branches ; R_1 bifurcate ; MA unbranched. Stridulatory file as in Text-fig. 85 ; broad, gently curved, teeth closely spaced. Tympanic organ without auricles.

Cerci as in Text-fig. 71 ; long, robust, arcuate, circular in transverse section, sinuose viewed in plane of principal curvature ; apex inflated behind large terminal spinule.

Lateral lobes of pronotum usually unmarked but very rarely with faint trace of longitudinal stria dorsad. Basal mark of fore wings of type shown in Text-fig. 16 : continuous black stripe about 1·0–2·5 mm long runs distad from beneath second axillary sclerite along centre of M ; variable number of fuscous cells on either side of $MP + Cu_{1a}$; no isolated dark cells in areas R, R_1 or R_s ; fuscous spot at apex usually well developed, very rarely absent. Hind wings hyaline except for apical archedictyon. Spinules of hind femora yellow or light brown at base, black at tip and set in black patches on femoral carina, or wholly black with or without dark area surrounding base. Tenth abdominal tergite, epiproct and cerci dark red or red-brown.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 51 ; infragonangulum prominent ventrad, with well developed ventral concavity causing inferior margin of lobe to appear more or less deeply emarginate from lateral viewpoint ; apex of dorsal valves smooth.

	Males	Females
Number of specimens examined :	168	131
Total length :	41·0–46·0	44·0–50·6
Median length of pronotum :	4·5–5·0	4·8–5·7
Length of hind femur :	20·2–23·4	21·4–25·9
Length of fore wing :	30·0–33·8	32·8–36·4
Stridulatory file—		
number examined :	20	
number of teeth (T) :	79–108	
length (replica) (F) :	2·06–2·48	
T/F :	35·4–46·0	

C. apicalis (Bolívar) is very similar to *C. neutralipennis* Karsch. The males of the two species are distinguishable clearly only by the form of the apex of the cerci. Female specimens may be very difficult to distinguish and it is sometimes necessary to place some reliance on their association with identifiable males. See also discussions under *C. neutralipennis* Karsch and *C. afra* (Karsch).

The known range of *C. apicalis* (Bolívar) extends across tropical Africa from Sierra Leone to Uganda.

Lectotype Designation. Of the two syntypes of *Catoptropteryx signatipennis* Karsch, I have selected and labelled the male specimen as the LECTOTYPE.

Holotype ♀. IVORY COAST : Assinie (*Alluaud*) (IEE Madrid).

GUINEA : Nimba, Ziéla, ii.1957, 1 ♂. SIERRA LEONE : Freetown, xi.1960, 1 ♀, xii.1966, 1 ♀. LIBERIA : N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Reserve Rest House, vii.1963, 7 ♂, 1 ♀. IVORY COAST : Forêt du Banco, x.1963, 26 ♂, 14 ♀, v.1964, 3 ♂, 3 ♀ ; Réserve du Banco, 1 ♂ ; Mokta, vi.1964, 1 ♂ ; Adiopodoumé, v.1954, 2 ♂, iv.1955, 1 ♂, x.1963, 2 ♂, 1 ♀, xi.1963, 1 ♀, iv.1964, 1 ♀, v.1965, 5 ♂, 1 ♀, vi.1965, 1 ♂, viii.1965, 2 ♂, ix.1965, 4 ♂, 2 ♀, x.1965, 1 ♀, xi.1965, 2 ♀, i.1966, 3 ♂, 2 ♀, ii.1966, 1 ♂, xii.1966, 1 ♂ ; Lamto, Toumodi, iii.1964, 1 ♀, iv.1964, 5 ♂, 23 ♀, xii.1965, 1 ♂, 2 ♀, x.1966, 2 ♂ ; Niangon, iii.1967, 1 ♂, 1 ♀ ; Apolo Piège, v.1960, 1 ♀ ; Barrage d'Ayamé, iv.1964, 1 ♀. GHANA : Accra, xii.1963, 1 ♂ ; Kade Agr. Res. Sta., vii.1963, 3 ♂, 5 ♀ ; Kumanin, 3 mls from Kade Agr. Res. Sta., 1 ♂, 1 ♀ ; Volta Region, Amedzofe, xi.1963, 1 ♀ ; Trans-Volta Togoland, Kpandu Rest House, xii.1959, 1 ♀ ; W. Region, near Wiawso, 30 mls N.W. of Tano Lodge, x.1960, 2 ♀ ; Bibianaha, ix–xii.1909, 1 ♂ ; Tafo, v–vi.1954, 2 ♂, vi.1955, 1 ♂, iv.1957, 1 ♀, v.1957, 1 ♂, 4 ♀, vi.1957, 13 ♂, 5 ♀, xi.1961, 8 ♂, 2 ♀, xii.1961, 5 ♂, 2 ♀, i.1962, 1 ♂, 4 ♀, ii.1962, 6 ♂, 3 ♀, iii.1962, 16 ♂, 4 ♀. NIGERIA : near Ibadan, Gombar, i.1965, 5 ♂, 7 ♀ ; Ibadan, x.1965, 1 ♀. CAMEROON : Efulen, xi.1920, 1 ♂, 1 ♀, ix.1922, 1 ♀, x.1922, 1 ♂, 2 ♀, xi.1922, 5 ♂, 3 ♀, xii.1922, 15 ♂, 4 ♀, i.1923, 5 ♂, iii.1923, 3 ♂ iv.1923, 1 ♂, v.1923, 1 ♀ ; Etandac, xi.1922, 1 ♂ ; Victoria, Muyuka, vi.1949, 1 ♀ ; Victoria, Mabete, v–vi.1949, 1 ♀ ; Victoria (*Preuss*) 1 ♂ (lectotype of *Catoptropteryx signatipennis* Karsch) (ZMHU Berlin) ; Lolodorf (*Conradt*) 1 ♀ (paralectotype of *Catoptropteryx signatipennis* Karsch) (ZMHU Berlin) ; Jabassi, iv.1850, 1 ♀ ; Johann-Albrechtshöhe, i.1896, 1 ♀. SPANISH GUINEA : Rio Manyani, vi.1919, 1 ♂. CONGO (BRAZZAVILLE) : Mts. du Chaillu, Mbila, xii.1963, 1 ♂, 3 ♀ ; Brazzaville, xi.1963, 2 ♀, i.1964, 1 ♂, ii.1964, 1 ♀ ; Bassin de la Sangha, 1899, 1 ♂. CONGO (KINSHASA) : Kibali-Ituri Dist., 10 mls W. Epulu R. ferry, Irumu-Avakubi Rd., Saidi, ix.1934, 1 ♀ ; Congo River, left bank, Lukolela, 1°5′ S., i.1921, 1 ♀. UGANDA : 7 mls from Entebbe, Zika Forest, ground level on steel tower, iii.–vi.1961, 1 ♂, 40 ft level, 1 ♂.

Catoptropteryx afra (Karsch)

(Text-figs. 17, 32)

Caedicia afra Karsch, 1889 : 446. Holotype ♀, NIGERIA : Benue[1] (IZPAN Warsaw) [examined].

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[1] The original description gives this locality, though the holotype itself is labelled merely ' Niger '.

Catoptropteryx afra (Karsch) Karsch, 1896 : 335 (footnote).

♂. Not known.

♀. Eyes moderately large, sub-globose, strongly prominent.

Height of lateral lobes of pronotum clearly exceeding length . R_s of fore wings bifurcate, as in Text-fig. 63 ; R_1 bifurcate ; *MA* unbranched. Tympanic organ without auricles.

Ovipositor not distinguishable from that of *C. neutralipennis* Karsch (Text-fig. 52) ; inferior margin of infragonangulum lobe not emarginate from lateral viewpoint ; apex of dorsal valves smooth.

Lateral lobes of pronotum without dark markings. Basal mark of fore wings of type shown in Text-fig. 17 : brown to black (in one specimen very faint, reddish) mark at base of *M*, about 0·4–0·8 mm long (0·4 mm in holotype), proximally not extending as far as second axillary sclerite. Cells on either side of $MP + Cu_{1a}$ darkened ; apex without dark spot. Hind wings hyaline except for apical archedictyon. Spinules of hind femora black only at tip, not set in dark patches on femoral carina.

	Holotype ♀	Other ♀♀
Number of specimens examined :	1	4
Total length :	50·3	40·2–46·2
Median length of pronotum :	6·2	4·7–5·2
Length of hind femur :	24·6	19·7–23·0
Length of fore wing :	37·4	29·5–34·1

The identity of the holotype is not at all plain. It resembles *C. apicalis* (Bolívar) in size and general appearance, but the form of the basal mechanism of the ovipositor is not distinguishable from that of *C. neutralipennis* Karsch, and in the coloration of the fore wing base it differs slightly from either of these species. *C. afra* (Karsch) is almost certainly a synonym of either *C. apicalis* (Bolívar) or *C. neutralipennis* Karsch (in fact, the last two may also prove to be one species—see discussion under *C. neutralipennis* Karsch) ; however, without males that could be confidently associated with the holotype, I have been unable to resolve the problem here. The four other females that I have included under this species agree with the holotype in the form of the ovipositor and the coloration of the fore wings and hind femora, but are considerably smaller.

C. afra (Karsch) is known only from Nigeria.

Holotype ♀. NIGERIA : Benue (IZPAN Warsaw).

NIGERIA : Ibadan, x.1956, 1 ♀, iv.1965, 1 ♀, xii.1966, 1 ♀, viii.1967, 1 ♀.

Catoptropteryx neutralipennis Karsch

(Text-figs. 1, 33, 52, 72, 86)

Catoptropteryx neutralipennis Karsch, 1896 : 334. Lectotype ♂, TOGO : Misahöhe (ZMHU Berlin) [examined].

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 33 ; height clearly exceeding length. R_s of fore wings bifurcate as in Text-fig. 63 ; R_1 bifurcate ; *MA* unbranched. Stridulatory file as in Text-fig. 86 ; broad, gently curved, teeth closely spaced. Tympanic organ without auricles.

Cerci as in Text-fig. 72 ; long, slender, arcuate, circular in transverse section, more or less sinuose viewed in plane of principal curvature ; apex more or less obtuse, but without conspicuous inflation, bearing small terminal spinule.

Lateral lobes of pronotum without dark marking. Basal mark of fore wings of type shown in Text-fig. 16 : continuous black stripe, about 1·0–2·5 mm long, runs distad from beneath second axillary sclerite along centre of M ; variable number of fuscous cells on either side of $MP + Cu_{1a}$; no isolated dark cells in areas R, R_1 or R_s ; fuscous spot at apex usually poorly developed or absent, rarely well developed. Hind wings hyaline except for apical archedictyon. Spinules of hind femora black at tip only, at tip and base, or wholly black, sometimes set in dark patches on femoral carina. Cerci red- or yellow-brown.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 52 ; inferior margin of lobe of infragonangulum not emarginate from lateral viewpoint ; apex of dorsal valves smooth.

	Males	Females
Number of specimens examined :	73	60
Total length :	37·8–43·3	37·7–44·0
Median length of pronotum :	4·1–4·9	4·3–4·8
Length of hind femur :	18·6–21·8	19·5–22·3
Length of fore wing :	27·7–31·5	28·5–31·9
Stridulatory file—		
number examined :	21	
number of teeth (T) :	64–101	
length (replica) (F) :	1·73–2·37	
T/F :	34·0–42·6	

This species can be distinguished with certainty from *C. apicalis* (Bolívar) only by the shape of the cercal apex in the male. Identification of female specimens may be impossible, for while the ovipositors of the two species may have quite different superficial appearances, their structure is essentially similar and many specimens appear intermediate when compared with the figures given here. The differences may be due to the effects of very slight differences in the relative growth rates of the basal sclerites on the manner of distortion of the integument during development. Such small differences in relative growth rates need not of course be between species, and are quite likely to be intraspecific. They are also likely to be related to the absolute dimensions of the adult insect, and since *C. apicalis* (Bolívar) is larger on average than *C. neutralipennis* Karsch, a size-related feature could falsely appear to be a specific character. There are some grounds for believing that this is probably the case here, and since the females have been segregated entirely on the appearance of the basal mechanism of the ovipositor, the division into ' species ' may be in effect no more than a separation of the larger specimens from the smaller, and as such does not necessarily correspond in any way to the division between the two male forms, which is based on a discontinuity in the form of the cerci. In both sexes the two species are so similar in all other features that the possibility must be borne in mind that they and *C. afra* (Karsch) may all belong to one species, dimorphic in the male sex over part of its range, and highly variable in size. At present, however, there is not sufficient evidence to justify synonymizing the three names.

C. neutralipennis Karsch is distributed in West Africa from Sierra Leone to Cameroon.

Lectotype Designation. Of the two syntypes of *Catoptropteryx neutralipennis* Karsch, I have selected and labelled the male specimen as the LECTOTYPE.

Lectotype ♂. Togo : Misahöhe, 26.vi.1894 (*Baumann*) (ZMHU Berlin).

Paralectotype ♀. Togo : Bismarckburg, 30.x.–5.xi.1893 (*Conradt*) (ZMHU Berlin).

Guinea : Nimba, vii–xii.1951, 1 ♂ ; Nimba, Ziéla, ii.1957, 1 ♂, iii.1957, 4 ♂, 1 ♀, v.1957, 6 ♂, 2 ♀. Sierra Leone : Freetown, i.1956, 1 ♂, x.1966, 1 ♂ ; Njala, viii.1926, 1 ♂. Liberia : N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Reserve Rest House, vii.1963, 3 ♂, 1 ♀ ; Marshall Territory, iii.1955, 1 ♂, iv.1955, 1 ♂, 1 ♀, v.1955, 3 ♂, 2 ♀, vi.1955, 3 ♂, vii.1955, 2 ♀, ix.1955, 3 ♂, x.1955, 2 ♀, iii.1956, 2 ♀, iv.1956, 3 ♂, 1 ♀, v.1956, 1 ♀, vi.1956, 1 ♀, i.1957, 1 ♂, iii.1957, 1 ♀. Ivory Coast : Forêt du Banco, x.1963, 1 ♂, 1 ♀ ; Lamto, Toumodi, iv.1964, 4 ♂, 2 ♀ ; Yalé, iv.1964, 1 ♂ ; Adiopodoumé, ii.1967, 1 ♀ ; Séguela, xii.1964, 1 ♀ ; Mokta, vi.1964, 1 ♀. Ghana : Trans-Volta Togoland, Kpandu, xii.1959, 1 ♂ ; E. Region, Kade Agr. Res. Sta., vii.1963, 4 ♂, 8 ♀ ; Kumanin, 3 mls from Kade Agr. Res. Sta., vii.1963, 1 ♀ ; W. Region, Sefwi-Bekwai, Shell filling sta., x.1960, 1 ♂ ; Bibianaha, ix–xii.1909, 1 ♂ ; Ashanti, near Nabaume, 6°37′N, 1°17′W, viii.1957, 1 ♀ ; Tafo, v–vi.1954, 1 ♂, 2 ♀, iv.1957, 3 ♂, 2 ♀, v.1957, 2 ♂, 7 ♀, vi.1957, 8 ♂, 9 ♀, xi.1961, 3 ♂, xii.1961, 2 ♂, 3 ♀, i.1962, 1 ♂, iii.1962, 1 ♂, 1 ♀. Nigeria : W. Province, Ibadan, xii.1960, 1 ♀ ; 24 mls S. of Benin, Sapoba Forestry Sta., i.1961, 1 ♀ ; Bende, 1 ♀. Cameroon : Efulen, xi.1922, 2 ♂, 1 ♀, iii.1923, 1 ♀.

***Catoptropteryx ambigua* sp. n.**

(Text-figs. 1, 34–36, 53, 73, 87)

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-figs. 34–36 ; height clearly exceeding length. R_s of fore wings as in Text-fig. 63, bifurcate ; R_1 bifurcate ; MA unbranched. Stridulatory file as in Text-fig. 87, narrow, almost straight, teeth closely spaced. Tympanic organs without auricles.

Cerci as in Text-fig. 73 ; moderately long, circular in transverse section, arcuate, sinuose viewed in plane of principal curvature ; apex obtuse, bearing small spinule.

Lateral lobes of pronotum dorsad with variable longitudinal stria, as in Text-figs. 35–36, black to faint red, occasionally totally absent. Basal mark of fore wings of type shown in Text-fig. 16 : continuous black stripe runs distad from beneath second axillary sclerite along centre of M ; broad band of fuscous cells on either side of $MP + Cu_{1a}$; no isolated dark cells in areas R, R_1 or R_s ; fuscous spot at apex usually very well developed, more rarely faint or absent. Hind wings hyaline except for apical archedictyon. Spinules of hind femora wholly black and set in black patches on femoral carina, as in Text-fig. 67 ; hind femora usually with numerous fuscous spots in distal half ; hind tibiae wholly dark grown to black, sometimes lighter ventrally ; hind tarsi black to very dark green. Cerci red-brown ventrally, black dorsally.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 53 ; lobe of infragonangulum small compared with first gonocoxa ; apical margin of dorsal valves smooth.

	Males	Females
Number of specimens examined :	7	3
Total length :	35·4–38·9	37·8–40·5
Median length of pronotum :	3·7–4·3	4·3–4·7
Length of hind femur :	19·1–20·6	19·0–22·2
Length of fore wing :	25·7–28·1	27·6–30·8
Stridulatory file—		
number examined :	6	
number of teeth (T) :	63–80	
length (replica) (F) :	1·47–1·83	
T/F :	35·0–44·4	

C. ambigua sp. n. is similar in many respects to *C. neutralipennis* Karsch and to *C. punctulata* (Karsch). There is no possibility of confusion with the latter species which has a unique coloration of the fore wings. It may be distinguished from *C. neutralipennis* Karsch by the ovipositor, the coloration of the hind legs, and the pronotal stria when this is present. The ovipositor is rather similar to that of *C. nigrospinosa* (Brunner) but may be distinguished easily enough. The locality may be helpful in identifying difficult specimens (*e.g.* badly discoloured males), since the range of the species does not appear to overlap those of its most easily confused relatives.

C. ambigua sp. n. is known only from Cameroon, Congo (Kinshasa) and Uganda.

Holotype ♀. UGANDA : Bwamba, Ntandi, ii.1968 (BMNH).

Paratypes. CAMEROON : Ja River, Bitye, vi–vii.1909, dry season, 1 ♂ (ANS Philadelphia). CONGO (KINSHASA) : Sankuru, Komi, vii.1930 (*Ghesquière*) 1 ♂ (MRAC Tervuren) ; Busira, vi.1936 (*Ghesquière*) 1 ♂ (BMNH) ; 73 mls E. of Kama, viii.1957 (*Ross & Leech*) 1 ♀ (BMNH) ; Flandria, xii.1930 (*Hulstaert*) 1 ♀ (MRAC Tervuren). UGANDA :————, 1 ♂ (BMNH) ; Bwamba, Ntandi, ii.1968, 1 ♂ (BMNH) ; Bwamba, v.1956 (*Carcasson*) 1 ♂ (CM Nairobi) ; 7 mls from Entebbe, Zika Forest, lakeside swamp, 40 ft level on steel tower, iii–vi.1961 (*Corbet*) 1 ♂ (BMNH).

Catoptropteryx nigrospinosa (Brunner)

(Text-figs. 37, 54)

Caedicia nigro-spinosa Brunner, 1891 : 97. Holotype ♀, CAMEROON (IZPAN Warsaw). [examined].

Catoptropteryx nigrospinosa (Brunner) Kirby, 1906 : 415.

♂. Not known.

♀. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 37 ; height clearly exceeding length. R_s of fore wings with 2 branches as in Text-fig. 63 ; R_1 bifurcate ; MA unbranched. Tympanic organs without auricles.

Ovipositor as in Text-fig. 54 ; apical margin of dorsal valves smooth.

Fore wings without dark markings at base ; membrane blackened for short distance on either side of $MP + Cu_{1a}$, but without isolated fuscescent cells in areas R, R_1 or R_s ; small fuscous spot at apex. Hind wings hyaline except for apical archedictyon. Spinules of hind femora wholly black and set in dark brown to black patches on femoral carina ; hind femora with numerous brown spots in distal half. Hind tibiae somewhat darkened dorsally.

	Females
Number of specimens examined :	2
Total length :	41·0–43·0
Median length of pronotum :	4·5–4·8
Length of hind femur :	20·3–20·4
Length of fore wing :	29·4–31·0

The structure of the ovipositor shows an affinity with *C. ambigua* sp. n., but the coloration of *C. nigrospinosa* (Brunner) clearly distinguishes it from all the other species of the genus.

This species is known only from Cameroon.

Holotype ♀. CAMEROON (IZPAN Warsaw).

CAMEROON : Efulen, 4.xii.1922, 1 ♀ (ANS Philadelphia).

Catoptropteryx punctulata (Karsch)

(Text-figs. 1, 16, 38–39, 55, 64, 74, 88)

Caedicia punctulata Karsch, 1890*a* : 260. Holotype ♀, CAMEROON : Kribi (ZMHU Berlin) (in alcohol) [examined].

Catoptropteryx maculipennis Karsch, 1896 : 333. Holotype ♀, CAMEROON : Lolodorf (ZMHU Berlin) [examined]. **Syn. n.**

Catoptropteryx punctulata (Karsch) Kirby, 1906 : 415.

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-figs. 38–39 ; height clearly exceeding length. Fore wings as in Text-fig. 64 ; R_s bifurcate ; R_1 bifurcate ; MA unbranched. Stridulatory file as in Text-fig. 88 ; broad, curved, teeth widely spaced over three quarters of length ; in posterior quarter, file abruptly sinuose, with closely spaced teeth. Tympanic organs without auricles.

Cerci as in Text-fig. 74 ; short, arcuate, depressed in apical half, strongly sinuose viewed in plane of principal curvature ; apex acute, bearing terminal spinule.

Lateral lobes of pronotum as in Text-figs. 38–39 ; variable, continuous or broken, longitudinal brown to black stria dorsad, very rarely faint or absent. Basal mark of fore wings of type shown in Text-fig. 16 : continuous black stripe usually about 6 mm long, sometimes shorter, runs distad from beneath second axillary sclerite along centre of M and MP ; band of fuscous cells on either side of $MP + Cu_{1a}$ usually broad and giving fore wings purple-brown appearance ; in areas R, R_1 and R_s variable number of scattered fuscous to fuscescent cells, isolated or in small groups ; fuscous spot at apex usually very well developed. Hind wings usually faintly fumose, darker towards margin of anal fan, sometimes hyaline, except for apical archedictyon. External spinules of hind femora usually wholly black, but not set in dark patches on femoral carina. Hind tibiae dorsally more or less fuscescent, with darker area at base of each spinule ; rarely, entirely fuscous. Tenth abdominal tergite with pair of large, dark brown spots, or single median dark area ; epiproct dark brown ; cerci yellow-brown, dark brown to black dorsally.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 55 ; first gonocoxa large, very slightly concave ; valves slender ; apex of dorsal valve smooth. Basal mark of fore wings generally shorter than in ♂, about 0·5–5·0 mm long.

	Males	Females
Number of specimens examined :	150	73
Total length :	34·3–38·5	35·8–40·8
Median length of pronotum :	4·0–4·6	4·0–4·8
Length of hind femur:	17·6–20·8	18·8–21·6
Length of fore wing :	25·5–29·6	25·8–29·7
Stridulatory file—		
number examined :	20	
number of teeth (T) :	32–43	
length (replica) (F) :	1·23–1·56	
T/F :	23·9–33·3	

This is one of the most clearly defined species in the genus, being conspicuously unique in the coloration of the fore wings, and the form of the male cerci, stridulatory file and ovipositor valves. The basal mechanism of the ovipositor is very similar to that of *C. guttatipes* Karsch, differing from this chiefly in the deeper concavity of its first gonocoxa. It is best distinguished from this species by the more slender ovipositor, the depressed cerci of the male, and the type of basal mark of the fore wings. The number and depth of colour of the dark cells of the fore wings are very variable, and the isolated spots characteristic of the species are not always easily discerned ; a piece of white paper held behind the wing is sometimes helpful in detecting these in badly faded specimens.

The known range of *C. punctulata* (Karsch) extends across tropical Africa from Sierra Leone to Uganda.

Holotype ♀. Cameroon : Kribi, xii.1888[2] (*Morgen*) (ZMHU Berlin) (in alcohol).

Guinea : Nimba, vii–xii.1951, 1 ♂, 1 ♀, 1951, 1 ♂ ; Nimba, Ziéla, ii.1957, 1 ♂, iii.1957, 6 ♂, v.1957, 7 ♂ ; Nimba, Camp Gouan, i.1957, 1 ♂ ; Nimba, Kéoulenta, xii.1956, 1 ♂. Sierra Leone : Freetown, Mt. Aureol, i.1956, 1 ♂ ; Njala, x.1928, 1 ♂, iii.1933, 1 ♂ ; Monts Loma, Forêt Camp, 1070 m, v.1963, 1 ♂. Liberia : Mt. Coffee, iii.1897, 1 ♂ ; N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Reserve Rest House, vii.1963, 1 ♂ ; Marshall Territory, iii.1955, 1 ♂, iv.1955, 1 ♀, vi.1955, 1 ♂, 1 ♀, vii.1955, 3 ♂, viii.1955, 1 ♀, ix.1955, 1 ♂, i.1956, 1 ♂, ii.1956, 1 ♂, iv.1956, 3 ♀, x.1956, 1 ♂, i.1957, 1 ♂, v.1957, 1 ♂. Ivory Coast : Nimba, iv.1964, 1 ♂ ; Forêt du Banco, x.1963, 5 ♂, 3 ♀, v.1964, 1 ♂ ; Réserve du Banco, 2 ♂ ; Adiopodoumé, i.1953, 1 ♀, xii.1953, 1 ♂, iv.1955, 1 ♂, xi.1963, 1 ♂, v.1965, 2 ♂, vi.1965, 1 ♂, viii.1965, 1 ♂, x.1965, 2 ♂, iii.1967, 1 ♀ ; Lamto, Toumodi, iv.1964, 1 ♂ ; N'dzida, vi.1952, 1 ♀ ; 6 km from Tai, i.1955, 2 ♀ ; Azaguie, xi.1963, 1 ♀. Ghana : W. Region, nr. Wiawso, 3 mls N.W. of Tano Lodge, x.1960, 2 ♂ ; Ashanti, Bobiri Forest Reserve, 23 mls S.E. of Kumasi, xi.1959, 1 ♂, 1 ♀ ; nr. Kumain, Bobiri Reserve, vii.1957, 1 ♂ ; Bibianaha, ix–xii.1909, 1 ♂ ; E. Region, Kade Agr. Res. Sta., vii.1963, 1 ♂ ; Tafo, 1 ♀, v–vi.1954, 3 ♂, iv.1957, 8 ♂, 6 ♀, v.1957, 5 ♂, 8 ♀, vi.1957, 10 ♂, 11 ♀, xi.1961, 11 ♂, 6 ♀, xii.1961, 12 ♂, 1 ♀, i.1962, 4 ♂, 2 ♀, ii.1962, 11 ♂, 3 ♀, iii.1962, 2 ♂, 5 ♀. Nigeria : Oban Dist., 1 ♂ ; nr. Ibadan, Gombar, i.1965, 1 ♀. CAMEROON : Efulen, x.1922, 1 ♂, xi.1922, 2 ♂, xii.1922, 3 ♂, 1 ♀, i.1923, 3 ♂, iii.1923, 1 ♂, iv.1923, 1 ♂, 1 ♀ ; Douala, v.1961, 1 ♂ ; Mundame, viii.1911, 2 ♀ ; Lolodorf (*Conradt*) 1 ♀ (ZMHU Berlin) (holotype of *Catoptropteryx maculipennis* Karsch). CONGO (BRAZZAVILLE) : Oka, 1200 ft, ii.1948, 1 ♂ ; Odzala, x.1963, 1 ♂; Mayumbe, Dimonika, i.1964, 1 ♂ ; Mts. du Chaillu, Mbila, xii.1963, 1 ♂. CONGO (KINSHASA) : Eskibondo, betw. Nigangara & Dungu, Uele, 2650 ft, x.1934, 1 ♂ ; Kai Bumba, x.1920, 1 ♂ ; Région des Lacs, 1 ♂ ; 39 km S. of Walikale, 700 m, xii. 1957, 1 ♀ ; Ubangi, Budjalibala, ii.1949, 1 ♀ ; Eala, iv.1935, 1 ♀ ; Janda Sundi, x.1920, 1 ♀. UGANDA : Mpanga Forest, viii.1965, 1 ♀, x.1965, 1 ♂ ; 1 ml E. of Bundebugyo, viii.1964, 1 ♀ ; Bugoma Forest, vi.1933, 1 ♂.

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[2] The date 23.v.1890 also appears on the label of the holotype but is clearly not the date of collection.

Catoptropteryx guttatipes Karsch

(Text-figs. 1, 15, 40, 56, 75, 89)

Catoptropteryx guttatipes Karsch, 1890*b* : 362. Holotype ♂, CAMEROON : Barombi-Station (ZMHU Berlin) [examined].

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 40 ; height clearly exceeding length. R_s of fore wings bifurcate as in Text-fig. 63 ; R_1 bifurcate ; MA unbranched. Stridulatory file as in Text-fig. 89 ; narrow, moderately curved, teeth widely spaced. Tympanic organs without auricles.

Cerci as in Text-fig. 75 ; short, arcuate, circular in transverse section, not depressed, strongly sinuose viewed in plane of principal curvature ; apex obtuse, bearing small spinule.

Pronotal lobes usually with no dark markings ; very rarely with very faint trace of longitudinal stria dorsad. Fore wings in region of stridulatory organ, including area M, black, red-brown or yellow-brown with black membrane ; basal mark of fore wings of type shown in Text-fig. 15 : continuous black stripe, about 1 mm long, or continuous with main dark region of area M, runs distad from beneath second axillary sclerite into area M, not along centre of M ; membrane fuscous in cells on either side of $MP + Cu_{1a}$; no isolated dark cells in areas R, R_1 or R_s ; apical fuscous spot usually small, sometimes faint or absent. Hind wings hyaline except for apical archedictyon. External spinules of hind femora usually wholly black and set in dark spots on femoral carina, less commonly not set in dark spots, rarely blackened only at tip ; hind femora rarely with one or two fuscous bands in distal half (see below). Hind tibiae dorsally usually more or less fuscous with darker spot at base of each spinule. Tenth abdominal tergite and epiproct with variable brown to black markings, former often with pair of black spots ; cerci blackened dorsally.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 56 ; first gonocoxa large, fairly strongly concave ; apex of dorsal valves smooth. Usually no dark markings at base of fore wings except short black stripe in area M, as in Text-fig. 15 ; rarely archedictyon fuscous over whole of cubito-anal area.

	Males	Females
Number of specimens examined :	32	25
Total length :	38·6–43·7	36·7–44·1
Median length of pronotum :	4·2–4·7	4·1–4·8
Length of hind femur :	18·9–21·9	19·1–21·7
Length of fore wing :	28·6–32·5	28·6–32·4
Stridulatory file—		
number examined :	30	
number of teeth (T) :	33–82	
length (replica) (F) :	1·40–2·11	
T/F :	21·6–39·4	

The ovipositor of this species is extremely similar to that of *C. punctulata* (Karsch), differing chiefly in its more strongly concave first gonocoxa and much less slender valves. Male specimens could be confused with *C. occidentalis* sp. n. and may best be distinguished by their shorter, more strongly sinuose cerci. Two male specimens from Congo (Kinshasa) and one female from Cameroon have two conspicuous fuscous bands, one apical, in the distal half of the hind femora. The males are set apart from the rest of the material examined also by the high number of teeth (79 and 82) in the stridulatory file. These two males are linked tenuously to the other 27 examined, among which the highest tooth number recorded was 55, by one specimen with 63 stridulatory teeth (see Text-fig. 1), and with no trace of dark bands on the hind femora. None of these unusual individuals differs sufficiently from the other material in any other characters to be considered specifically distinct, and the variation seems to have no broad geographic significance, so no formal nomenclatural recognition is indicated.

C. guttatipes Karsch appears to be sparsely distributed in Central Africa from eastern Nigeria to Uganda, but is also recorded here from two localities in southern Guinea.

Holotype ♂. CAMEROON : Barombi-Station (*Preuss*) (ZMHU Berlin).

GUINEA : W. of Irié, Col de Seredou, vii.1963, 1 ♂ ; Nimba, vii–xii.1951, 1 ♀. NIGERIA : Eastern Prov., 20 mls N.E. of Calabar, Forest Reserve, i.1961, 1 ♂. CAMEROON : ———, 3 ♂, 1 ♀ ; Johann-Albrechtshöhe, iv.1896, 1 ♂, viii.1896, 1 ♀ ; Tiko Pl., Matute, v.1949, 1 ♂ ; Mundame, 1 ♀ ; Kumba, xi.1938, 1 ♀, vi.1959, 1 ♀ ; Ja River, Bitye, 2 ♀, vi–vii.1909, dry season, 1 ♂, 1 ♀ ; Victoria, 4 ♀ ; Efulen, ix.1922, 1 ♂, xi.1922, 4 ♂, xii.1922, 1 ♂, 4 ♀, i.1923, 2 ♂, ii.1923, 1 ♂. CONGO (BRAZZAVILLE) : Sanga R., Nola, 1300 ft, x.1934, 1 ♂ ; Mts. du Chaillu, Mbila, xii.1963, 2 ♂, 1 ♀ ; Odzala, x.1963, 1 ♂. CONGO (KINSHASA) : 39 km S. of Walikale, ix.1957, 1 ♂ ; Ituri Forest, 4000 ft, iv.1930, 1 ♂ ; Bangala, Loka, xii.1931, 1 ♂ ; Kivu, Costermansville, 1951, 1 ♂ ; Mayumbe, Makungu, xi.1912, 1 ♂ ; Tshuapa, Flandria, xi.1940, 1 ♂ ; Yambata, ii–iii.1914, 1 ♀ ; Libenge, i.1937, 1 ♀ ; Stanleyville, vii.1912, 1 ♀ ; Binga, iii.1932, 1 ♀ ; Kibali-Ituri Dist., Irumu-Avakubi Rd., 10 mls W. Epulu R. ferry, Saidi, 2800 ft, ix.1934, 1 ♀.

Catoptropteryx occidentalis sp. n.

(Text-figs. 1, 41, 57, 76, 90)

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 41 ; height clearly exceeding length. R_s of fore wings bifurcate as in Text-fig. 63 ; R_1 bifurcate ; *MA* unbranched. Stridulatory file as in Text-fig. 90, broad, moderately curved, teeth widely spaced. Tympanic organs without auricles.

Cerci as in Text-fig. 76 ; long and slender, circular in transverse section, arcuate, somewhat sinuose viewed in plane of principal curvature ; terminating in small spinule.

Fore wings in region of stridulatory organ, including area *M*, red-brown to yellow-brown with black membrane and sometimes black Cu_2 ; basal mark of fore wings of type shown in Text-fig. 15 : continuous black stripe, about 1·5 mm long, runs distad from second axillary sclerite into area *M*, not along centre of *M* ; membrane fuscous in cells on either side of $MP + Cu_{1a}$; no isolated dark cells in areas *R*, R_1 or R_s ; fuscous or fuscescent spot, usually well developed, at apex. Hind wings hyaline except for apical archedictyon. External spinules of hind femora usually wholly black, sometimes also set in dark patches on femoral carina. Hind tibiae dorsally more or less fuscescent, with darker area at base of each spinule. Tenth abdominal tergite, epiproct and cerci red-brown ; cerci blackened dorsally in proximal half.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 57 ; form of basal mechanism highly distinctive : first gonocoxa very large, with ventro-posterior angle about 90° containing small, deep depression ; second gonocoxa particularly prominent ; apical margin of dorsal valves smooth. No dark coloration at base of fore wings except basal stripe in area *M*.

	Males	Females
Number of specimens examined :	4	5
Total length :	41·8–43·8	40·9–42·8
Median length of pronotum :	4·8–5·0	4·7–5·0
Length of hind femur :	21·0–21·7	20·0–21·4
Length of fore wing :	31·2–32·7	30·7–32·3
Stridulatory file—		
number examined :	4	
number of teeth (T) :	41–46	
length (replica) (F) :	1·73–1·98	
T/F :	22·2–26·6	

C. occidentalis sp. n. is nearest morphologically to *C. guttatipes* Karsch with which the males could sometimes be confused ; the cerci, however, are usually much longer and rather less sinuose than in the latter species. The females are easily distinguished by the form of the basal mechanism of the ovipositor, which is quite unlike that of any other species.

This species is known only from Liberia and Ivory Coast.

Holotype ♀. LIBERIA : N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Reserve Rest House, 23.vii.1963 (*Jago*) (BMNH).

Paratypes. IVORY COAST : Forêt du Banco, 15.x.1963, 2 ♂, 1 ♀ (BMNH), 1 ♂ (ORSTOM Abidjan), 12.v.1964, 1 ♂ (ORSTOM Abidjan) ; Tai, 21.i.1955, 1 ♀ (ORSTOM Abidjan) ; Forêt sud, Ndzida, 31.v.1952, 1 ♀ (ORSTOM Abidjan) ; ————, 6.ii.1960 (*Cachan*) 1 ♀ (ORSTOM Abidjan).

Catoptropteryx serrifera sp. n.

(Text-figs. 1, 42, 58, 77, 91, 94–95)

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-fig. 42 ; length usually about equal to, or slightly exceeding height ; rarely length very slightly less than height. R_s of fore wings with 2 or rarely 3 branches as in Text-fig. 63 ; R_1 bifurcate ; *MA* unbranched. Stridulatory file as in Text-fig. 91, usually almost straight, teeth closely spaced. Tympanic organ without auricles.

Cerci as in Text-fig. 77 ; short, arcuate, circular in transverse section, more or less sinuose viewed in plane of principal curvature ; terminating in small spinule which is sometimes unguiform.

No dark markings apart from blackened tips of spurs and spinules. External spinules of hind femora black or dark brown apically, or wholly so, but with no dark area around their bases. Hind wings hyaline except for apical archedictyon.

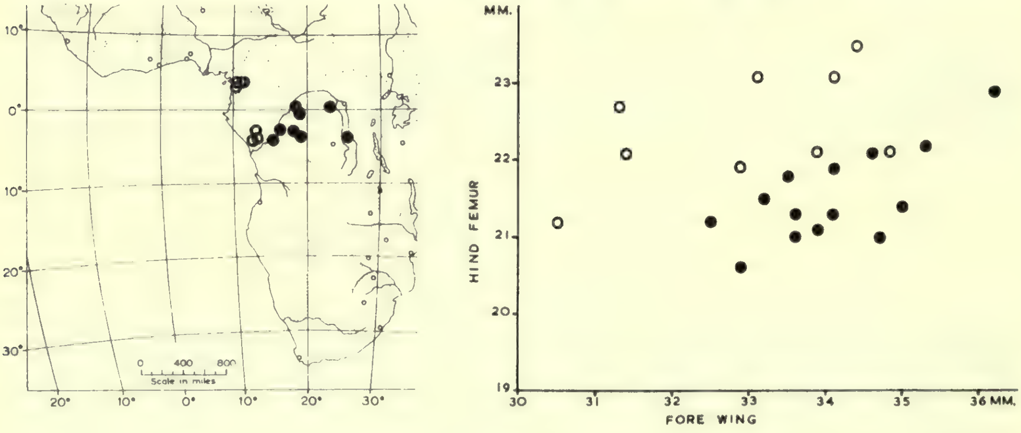
♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 58 ; apex of dorsal valve crenulate, bearing about 4–5 very small irregular teeth.

	Males	Females
Number of specimens examined :	13	16
Total length :	40·3–47·3	40·5–45·0
Median length of pronotum :	4·6–5·6	4·7–4·5
Length of hind femur :	21·2–22·9	20·6–23·5
Length of fore wing :	30·5–36·2	31·4–35·4
Stridulatory file—		
number examined :	13	
number of teeth (T) :	58–77	
length (replica) (F) :	1·55–2·05	
T/F :	33·2–47·4	

The form of the lateral lobes of the pronotum, the absence of black markings from the pronotum and from the base of the fore wings, and the absence of tympanic auricles, taken in combination distinguish this species from its congeners. The female is additionally characterized by the distinctive, though somewhat variable, form of the basal sclerites of the ovipositor, and its toothed dorsal valves.

This species presents a morphological link between the typical species of the genus and the East African species with its tympanic auricles, its affinity with the latter species being manifest in the toothed ovipositor, the form of the basal sclerites and the shape of the pronotal lobes.

When the material from north of the Congo River is compared with that from the south side, differences in dimensions, and subtle differences in the ovipositors, are apparent. In the southern group the apical teeth of the ovipositor are bigger, the appearance of the basal sclerites is somewhat different and the length of the fore wings relative to that of the hind femora is less (see Text-fig. 95). It would not be



94 95

FIGS. 94–95. *Catoptropteryx serrifera* sp. n. : 94, map showing the distribution ; 95, scatter diagram of length of hind femur plotted against length of fore wing. Black disks represent specimens from south, open circles specimens from north, of the Congo River.

unreasonable to suppose that the Congo River might sufficiently restrict gene-flow between the northern and southern populations for stable subspecific distinctness of the two groups to be maintained. Carcasson (1964) stated : ' Very often the ranges of two vicariants will be separated by a partial geographic barrier which may not have been the cause of the original disjunction, but may help to stabilize their respective ranges . . . The Congo River and the Rift Valleys of East Africa are also important dividing lines, though not necessarily effective barriers '. In the present case, however, I consider there is not sufficient justification for introducing subspecific names into nomenclature, and any conclusions based on the morphological discontinuity between the groups must have regard to the small number of specimens examined.

C. serrifera sp. n. is known only from the lowland forest zone of Central Africa (Text-fig. 94).

Holotype ♀. CAMEROON : Efulen, 10.xi.1922 (*Weber*) (ANS Philadelphia).

Paratypes. CAMEROON ? :————, 23.v.1890 (*Morgen*) 1 ♂ (ZMHU Berlin) (in alcohol). CAMEROON : Metet, 21.iii.1942, 1 ♂ (ANS Philadelphia) ; Sangamelima, Fulasi, v.1920 (*Evans*) 1 ♂ (MZUM Ann Arbor) ; Lolodorf, 21.i.1919 (*Reis*) 1 ♂ (MZUM Ann Arbor) ; Efulen, 16.xi.1922 (*Weber*) 1 ♂ (ANS Philadelphia), 4–23.xii. 1922 (*Weber*) 2 ♂, 1 ♀ (ANS Philadelphia), 1 ♂ (BMNH), 15.i.1923 (*Weber*) 1 ♀ (BMNH). CONGO (BRAZZAVILLE) : Chaillu Mts., Mbila, xii.1963 (*Descarpentries & Villiers*) 2 ♂, 1 ♀ (MNHN Paris), 1 ♂ (BMNH) ; Sibiti, xi.1963 (*Descarpentries & Villiers*) 1 ♀ (MNHN Paris), 1 ♀ (BMNH) ; Mayumbe, Dimonika, i.1964 (*Descarpentries & Villiers*) 1 ♀ (MNHN Paris). CONGO (KINSHASA) : Simba, x.1912 (*Mayné*) 1 ♂ (MRAC Tervuren) ; Lac Leopold II, Bolobo, 1955 (*Viccars*) 1 ♂ (BMNH) ; Equateur, Flandria, 1929 (*Hulstaert*) 2 ♀ (MRAC Tervuren) ; Oshwe, xii.1913 (*Maes*) 1 ♀ (MRAC Tervuren) ; Stanley Pool, 3–10.x.1957 (*Brien, Poll & Bouillon*) 1 ♀ (MRAC Tervuren) ; N'Kele, Kunungu, 1937 (*Schouteden*) 1 ♀ (MRAC Tervuren) ; Maniema, 1936 (*Henrard*) 1 ♀ (MRAC Tervuren) ; Tolo, xii.1913 (*Maes*) 1 ♀ (BMNH) ; Eala, xi.1934 (*Ghesquière*) 1 ♀ (BMNH) ; Equateur, Bokuma, 30.viii.1934 (*Hulstaert*) 1 ♀ (BMNH).

Catoptropteryx aurita **sp. n.**

(Text-figs. 1, 4, 12–13, 43–45, 59, 78, 92. Plate 1, fig. 3)

♂. Eyes moderately large, sub-globose, strongly prominent.

Lateral lobes of pronotum as in Text-figs. 43–45 ; approximately as high as long. R_s of fore wings as in Text-fig. 63, bifurcate, or rarely with 3 or 4 dichotomous branches ; R_1 with 2 or 3 branches ; MA unbranched. Stridulatory file as in Text-fig. 92 ; narrow, moderately curved, teeth widely spaced. Tympanic organs as in Text-figs. 12–13 ; internal side with auricle more or less well developed.

Cerci as in Text-fig. 78 ; short, circular in transverse section, arcuate, somewhat sinuose viewed in plane of principal curvature ; terminating acutely in small spinule. Styles comparatively large, with clear articulation with subgenital plate.

Lateral lobes of pronotum without dark marking or with partially developed black stria dorsad, as in Text-figs. 43–45. Fore wings without dark markings at base ; large fuscescent spot at apex ; membrane dark in cells adjacent to $MP + Cu_{1a}$, but no isolated dark cells in areas R, R_1 or R_5. Hind wings hyaline except for apical archedictyon. Spinules of hind femora apically or wholly black.

♀. As ♂ except for stridulatory organ and abdominal terminalia. Ovipositor as in Text-fig. 59 ; apex of dorsal valves serrate, bearing about 5–7 small teeth.

	Males	Females
Number of specimens examined :	10	10
Total length :	41·3–54·3	40·5–52·2
Median length of pronotum :	5·5–6·2	5·2–5·9
Length of hind femur :	21·4–25·5	20·7–26·0
Length of fore wing :	29·8–40·1	31·1–45·7
Stridulatory file—		
number examined :	10	
number of teeth (T) :	41–53	
length (replica) (F) :	1·68–2·21	
T/F :	23·5–26·5	

C. aurita sp. n. is very clearly distinct from the rest of the genus, having a rudimentary to quite well developed auricle on the internal side of the tympanic organ. The distribution has no intersection with that of any other species. *C. serrifera* sp. n. provides a geographical and morphological bridge from this to the typical species, having the unusual form of the pronotal lobe in common with *C. aurita* sp. n., an ovipositor in many respects intermediate, and a tympanic organ of the typical form. In *C. aurita* sp. n. the teeth of the ovipositor are larger and more regular in shape than in *C. serrifera* sp. n., and the form of the basal mechanism, though similar, can be distinguished easily enough ; however, the best distinguishing feature of specimens with poorly developed tympanic auricles is the number of teeth in the stridulatory file. The variations in coloration, size, and form of ovipositor and tympanic organ have no apparent geographic correlations.

C. aurita sp. n. is known only from East Africa, ranging from southern Kenya to southern Rhodesia and Mozambique (Text-fig. 4).

Holotype ♀. RHODESIA : Lundi, 3–5.iii.1964 (*van Son & Vári*) (TM Pretoria).

Paratypes. KENYA : Mombasa, iv.1955, 1 ♀ (BMNH). TANZANIA : E. Usambara Mts., Amani, 1950 (*Verdcourt*) 1 ♀ (CM Nairobi) ; Zanzibar, Mtoni, v.1954 (*Brown*) 1 ♂ (BMNH). ZAMBIA : Abercorn, 18–22.xi.1963 (*Vesey-Fitzgerald*) 1 ♂ (BMNH) ; ————(*Trenewith*) 1 ♀ (TM Pretoria). RHODESIA : Lundi, 3–5.iii.1964 (*van Son & Vári*) 1 ♂, 1 ♀ (BMNH), 3 ♂ (TM Pretoria) ; Vumba, 2–9.xi.1959 (*van Son*) 1 ♂ (BMNH) ; S. Melsetter, Vimba, x.1955, 1 ♀ (NM Bulawayo). MOZAMBIQUE : Kruger National Park, Pafuri, 24–28.iv.1961 (*Rorke*) 1 ♀ (TM Pretoria) ; Chiluvo Hills, x.1963 ,1 ♂ (BMNH), 3.xi.1963, 2 ♂, 2 ♀ (NM Bulawayo) ; Savanie Forest, x. 1963, 1 ♀ (NM Bulawayo).

Catoptropteryx extensipes Karsch

(Text-figs. 1, 5–6, 8–9, 46–47, 65, 79–81, 93)

Catoptropteryx extensipes Karsch, 1896 : 334. Holotype ♂, CAMEROON : Lolodorf (ZMHU Berlin) [examined].

♂. Eyes as in Text-figs. 5–6, 8–9 ; very large, elliptic, moderately, rarely strongly, prominent.

Lateral lobes of pronotum as in Text-figs. 46–47 ; height slightly greater than length. Fore wings as in Text-fig. 65 ; appreciably narrowed in distal half ; R_s bifurcate ; R_1 with 2 to 4 branches ; MA unbranched. Stridulatory file as in Text-fig. 93 ; broad, moderately curved, teeth widely spaced. Tympanic organs without auricles.

Cerci as in Text-figs. 79–81 ; strongly arcuate to U-shaped, near apex abruptly narrowed and bent downward slightly ; apex acute.

General coloration green. Frons, labrum and clypeus suffused with brown of variable intensity. Pronotal lobes unmarked, or with longitudinal brown to black stria dorsad as in Text-fig. 47, not extending as far as anterior margin. Basal mark of fore wings similar to type shown in Text-fig. 16 but very reduced in length and width, about 0·5 mm long ; cells in posterior half of wing fuscescent but not distributed in isolated groups in areas R, R_1 or R_5. Hind wings somewhat fumose, darker toward margin of anal fan. Herring-bone pattern of hind femora picked out in dark brown. Hind tibiae deep brown, paler or more reddish dorsally, with 2 broad, well defined, very pale yellow or green bands in proximal third. Tarsi and apex of tibiae almost black, with some small paler markings. Abdominal tergites with fuscous spot dorsally, tenth with broad fuscous or black patch ; epiproct and paraprocts dorsally with variable brown to black markings ; cerci wholly black.

♀. Not known.

	Males
Number of specimens examined :	11
Total length :	44·6–50·8
Median length of pronotum :	5·3–6·3
Length of hind femur :	25·7–30·0
Length of fore wing :	31·9–36·9
Stridulatory file—	
number examined :	11
number of teeth (T) :	49–79
length (replica) (F) :	2·07–2·71
T/F :	20·5–35·3

This species differs from the rest of the genus in so many characters, the most striking of which are the form of the eyes, cercus and fore wings, that one may suspect that the discovery of the female could make the erection of a new genus desirable for it. As it is, without the evidence of the female, and more particularly of the structure of the ovipositor, the species rests not too uncomfortably in *Catoptropteryx* Karsch, and it is most conveniently left here for the time being. There is some geographic variation in the pronotal coloration and the form of the cerci and eyes. At the western and eastern edges of the range the pronotal stria is absent, and in specimens from Cameroon and Fernando Póo the eyes are narrower (Text-figs. 5 and 8) and the cerci less strongly curved (Text-fig. 79).

Catoptropteryx extensipes Karsch has a West African distribution, ranging from Sierra Leone to Cameroon and Fernando Póo.

Holotype ♂. CAMEROON : Lolodorf (*Conradt*) (ZMHU Berlin).

GUINEA : Nimba, Ziéla, iii.1957, 3 ♂. SIERRA LEONE : Freetown, Mt. Aureol, vi.1956, 1 ♂. LIBERIA : N. of Monrovia, Bomi Hills, 5 mls N.E. of mines, Forest Reserve Rest House, vii.1963, 1 ♂. IVORY COAST : Forêt du Banco, x.1963, 1 ♂. GHANA : W. Region, near Wiawso, 3 mls N.W. of Tano Lodge, x.1960, 1 ♂. CAMEROON : Efulen, xi.1920, 1 ♂, xii.1922, 1 ♂. FERNANDO PÓO : 1901, 1 ♂.

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PLATE

PLATE 1

Fig. 1. Eggs of *Catoptropteryx* sp. on abaxial surface of *Ficus* leaf.
Fig. 2. *C. apicalis* (Bolívar), ♀.
Fig. 3. *C. aurita* sp. n., ♂.

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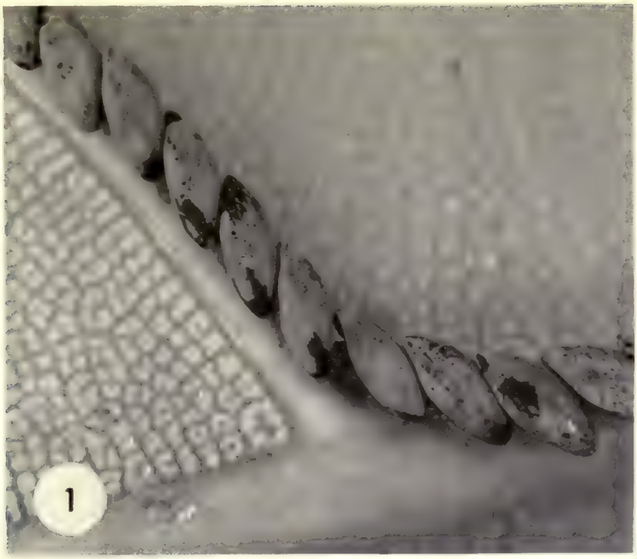

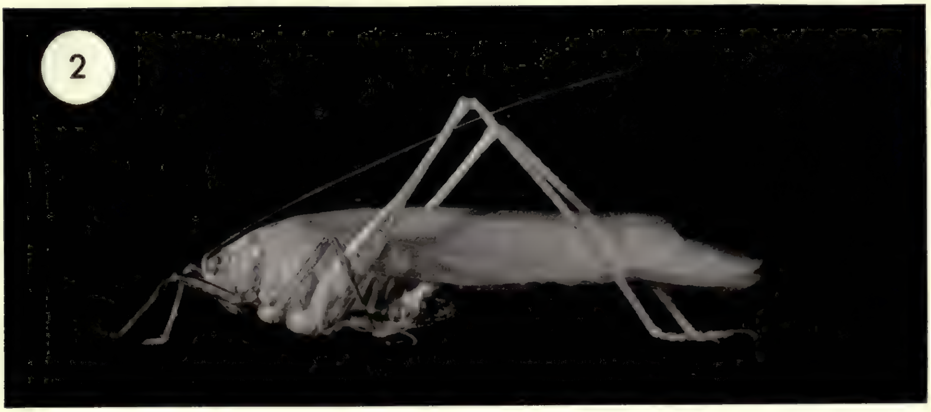

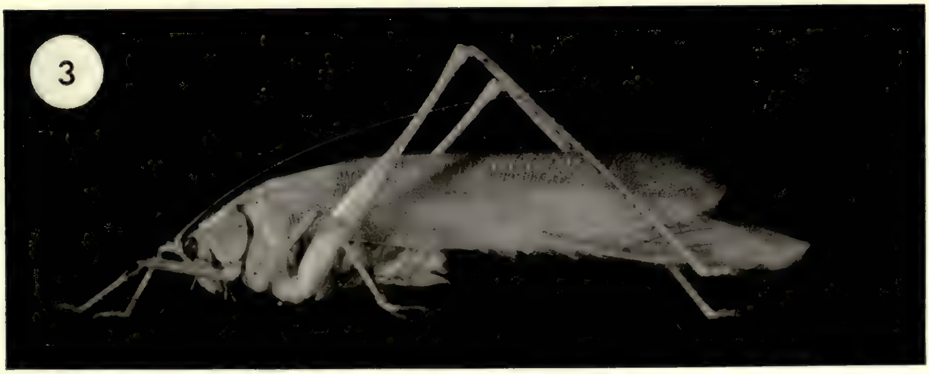

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A LIST OF THE TYPE-SPECIMENS OF ODONATA IN THE BRITISH MUSEUM (NATURAL HISTORY)

PART III

BRITISH MUSEUM
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D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 6
LONDON: 1970

A LIST OF THE TYPE-SPECIMENS OF ODONATA IN THE BRITISH MUSEUM (NATURAL HISTORY)

PART III

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29 JAN 1970
NATURAL HISTORY

BY

DOUGLAS ERIC KIMMINS

Pp. 171–205

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 6
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A LIST OF THE TYPE-SPECIMENS OF ODONATA IN THE BRITISH MUSEUM (NATURAL HISTORY) PART III

Families Platystictidae, Protoneuridae, Platycnemididae, Coenagriidae, Pseudostigmatidae, Perilestidae, Synlestidae, Lestidae, Megapodagriidae, Pseudolestidae & Polythoridae.

By D. E. KIMMINS

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SYNOPSIS

A list of the type-specimens of Odonata in the British Museum (Natural History), belonging to the eleven above-mentioned families has been prepared. Four hundred and two taxa are dealt with and lectotypes are designated for one hundred and thirteen of these taxa.

This list completes those published in 1968, *Bull. Brit. Mus. nat. Hist.* (Ent.) **22** (7) : 277–305, and 1969, op. cit. **23** (7) : 287–314. The present list was completed in May 1969.

ADDENDA TO PART I

peruviana Cowley **(*Aeschnosoma*)**, 1934 : 93–94, figs 1–2. Holotype ♀. 4206. *Aeschno) soma peruviana* Cowl. ♀. Peru, Prov. Moyombamba, Dep. S. Martin, Rioja (*P. Martin* HOLOTYPE. 1934, Stylops, 3 : 93, f. 1, 2. det. Cowley, coll. Cowley.

serva Kirby **(*Trithemis*)**, 1900 : 69–70, text-fig. 1. LECTOTYPE ♂. Sierra Leone, Free Town, 5.ix.[18]99 (*E. E. Austen*), with on reverse, 'T. serva K' / Trithemis serva Kirby, ♂ Lectotype, D. E. Kimmins det. 1967.

The lectotype lacks segments 7–10, and appears to be the example figured by Kirby.

tricolor Kirby (***Orthetrum***), 1894 : 555–556. Holotype ♂. Kandy, 30.vi.[18]92 / Ceylon, Yerbury Coll. / Orthetrum tricolor [WFK's writing].

This species was accidentally omitted from Kimmins (1968), probably in the course of typing the manuscript.

CORRECTION TO PART II

p. 307. ***multinervosa*** Fraser should be (***Devadatta***), not (***Diphlebia***).

PLATYSTICTIDAE

actaeon Laidlaw (***Drepanosticta***), 1934 : 558–559, fig. 3. Holotype ♂. Brit. N. Borneo, Mt Kinabalu, Kabayau, 600 ft, 8.v.1929 (*H. M. Pendlebury*) / Drepanosticta actaeon sp. n. Holotype, *Type* [Laidlaw's writing] / Drepanosticta actaeon Laidl.

One inferior appendage detached and glued to card.

anascephala Fraser (***Drepanosticta***), 1933. Kimmins, 1966 : 177.

antelopoides Fraser (***Protosticta***), 1931. Kimmins, 1966 : 178.

apicalis Kirby (***Platysticta***), 1894 : 561–562, pl. 42, fig. 1. LECTOTYPE ♂. [Ceylon], Belihul-Oya, 6.vi.[18]92 / apicalis, Kb. type / Platysticta apicalis Kirby, ♂ Lectotype, D. E. Kimmins det. 1968.

davenporti Fraser (***Protosticta***), 1930. Kimmins, 1966 : 188.

dentifera Kimmins (***Drepanosticta***), 1936 : 101–103, fig. 17. Holotype ♂. At Waterfall / Sarawak, Mt. Dulit, 3300 ft, Primitive forest / Drepanosticta dentifera sp. n. ♂, det. D. E. Kimmins.

dulitensis Kimmins (***Drepanosticta***), 1936 : 98, fig. 15. Holotype ♂. Sarawak, Mt Dulit, 3700 ft, 20.x.1932, on rocks below top crossing / Drepanosticta dulitensis ♂, sp. n., det. D. E. Kimmins.

forficula Kimmins (***Drepanosticta***), 1936 : 100–101, fig. 16. Holotype ♂. Sarawak, Mt Dulit, 4000 ft, moss forest, 16.x.1932 / Drepanosticta forficula sp. n. ♂, det. D. E. Kimmins.

gracilis Kirby (***Protosticta***), 1889 : 302. Holotype ♂. [Celebes], Tondano / Menado (*Wallace*) / Protosticta gracilis type [WFK's writing].

kinabaluensis Laidlaw (***Protosticta***), 1915*a* : 37–38, text-fig. 5B. Holotype ♂. Borneo (*J. C. Moulton*) / Protosticta kinabaluensis ♂ Laidlaw Type, Kina Balu, Borneo (*J. C. Moulton*), 5.ix.1913 [Laidlaw's writing].

greeni Kirby (***Platysticta***), 1891 : 204–205, pl. 20, figs 3, 3a. Holotype ♂. Ceylon / Ceylon, Pundaloya, viii.1889 (*E. E. Green*) / greeni (Type) [WFK's writing] / Platysticta greeni Kirby, ♂ Holotype.

Currently placed as a synonym of *Platysticta maculata* Selys.

hamadryas Laidlaw (***Drepanosticta***), 1931 : 187, fig. 2. Holotype ♂. *D. hamadryas* Kuala Tahan, Pahang, F.M.S., 300 ft, 20.xi.[19]21 (*H. Pendlebury*) [in Fraser's writing].

This specimen came to the BMNH with the Fraser Bequest.

hearseyi Fraser (***Protosticta***), 1922. Kimmins, 1966 : 195.

lankanensis Fraser (***Ceylonosticta***), 1931. Kimmins, 1966 : 200.

lindgreni Fraser (***Protosticta***), 1920. Kimmins, 1966 : 201.

lymetta Cowley (***Drepanosticta***), 1936 : 161–163, figs 13–14. Holotype ♂. Surigao, Mindanao, *Baker* / Philippine Is. (*C. F. Baker*) / Drepanosticta sp. ♂, H. Campion det. / Drepanosticta lymetta sp. n. HOLOTYPE, prothorax drawn August, det. J. Cowley, 1935.

marsyas Lieftinck (***Drepanosticta***), 1965 : 178–180, figs 3–7. Holotype ♂. Pahang, Cameron's Highlands, 4–5000 ft, 15.iv.[1935] (*H. M. Pendlebury*) / Drepanosticta marsyas ♂ Type [Laidlaw's writing] / Drepanosticta marsyas Lieft., HOLOTYPE, M. A. Lieftinck det. 1964.

megametta Cowley (***Drepanosticta***), 1936 : 163–167, figs 15–22. Holotype ♂. Surigao, Mindanao (*Baker*) / Drepanosticta megametta sp. nov., ♂ HOLOTYPE, prothorax, thoracic pattern and anal apps drawn. det. J. Cowley, August 1935.

mortoni Fraser (***Protosticta***), 1924. Kimmins, 1966 : 205.

mylitta Cowley (***Drepanosticta***), 1936 : 160–161, figs 1–12. Holotype ♂. Drepanosticta mylitta sp. n. ♂ HOLOTYPE. Borongan, Samar, Philippine Is. (*C. F. Baker*) det. J. Cowley, 1935 / details drawn, J. Cowley, 1935.

nietneri Fraser (***Ceylonosticta***), 1931. Kimmins, 1966 : 206.

pan Laidlaw (***Drepanosticta***), 1931 : 185–187, fig. 1. Lectotype ♂ (Lieftinck, 1965 : 174). Perak, Batang Padang, Jor Camp, June 1923 (*F. N. Chasen*) / Drepanosticta pan ♂ Type [Laidlaw's writing] / Lectotype selected by Lieftinck, 1964.

The apical abdominal segments are detached and glued to card.

paulina Drury (***Libellula***), 1773 : pl. 40, fig. 4.

Calvert (1932 : 4) was unable to trace the type of this species. McLachlan's collection, however, contained a single example, lacking head and abdomen, without locality label but bearing one of his type labels and labelled by him 'Palaemnema paulina Drury'. The apical brown wing markings are rather more extensive than in Drury's figure, extending basally by about the length of the pterostigma. If it is Drury's specimen, I suspect that it has been re-pinned. I have no information as to how this example came into McLachlan's possession, but see Kimmins (1969 : 306) under *titia*. Selys (1886 : 146) states 'Patrie: Mexique. Honduras d'après Drury; coll. Selys, Mac-Lachlan.' There is no indication that McLachlan's specimen was Drury's type, and I am of the opinion that it may have been labelled Type by McLachlan in error. I am retaining it in our type-collection in case information should come to light as to its history.

paulitoyaca Calvert (***Palaemnema***), 1931 : 47–49, pl. 5, figs 49, A-G″, pl. 18, figs 74–76. Holotype ♂. Atoyac, Vera Cruz, May (*H. H. S*[*mith*]). / Palaemnema paulina Drury, P. P. Calvert det. 1903, B. C. A. Neur. p. 136, Original of pl. 5, fig. 49 / Palaemnema paulitoyaca Calv. TYPE ♂, Original of figs 74, 76, pl. 18, Tr. Am. Ent. Soc., LVII, P. P. Calvert det. 1931.

rufostigma Kimmins (***Protosticta***), 1958 : 349, fig. 1. Holotype ♂. S. India, Tinnevelly Dt., Naraikadu, 2500–3000 ft, 3–8.x.1938 (*G. M. Henry*). Protosticta rufostigma Kimmins, ♂ TYPE, D. E. Kimmins det. 1947.

It may be pointed out that the date of capture is incorrectly given in the original description as September.

sanguinostigma Fraser (***Protosticta***), 1922. Kimmins, 1966 : 212.

silenus Laidlaw (***Drepanosticta***), 1934 : 557–558, fig. 2. Holotype ♂. Perak, Larut Hills, 4500 ft, 20.ii.1932 [no collector's name] / Drepanosticta silenus ♂ Laidlaw [labels D.E.K.].

Lieftinck (1965 : 176) designates the above example as lectotype, but this is not necessary as Laidlaw states that the BMNH ♂ is the holotype. Lieftinck also states that the ♀ allotype was not recovered. This I do not understand, as the allotype is in the Type Collection with the Holotype ♂.

stevensi Fraser (***Protosticta***), 1922. Kimmins, 1966 : 214.

versicolor Laidlaw (***Protosticta***), 1913 : 78. Holotype ♀. Sarawak, Lawas, 15.ix.[19]09 (*J. C. Moulton*) / Protosticta versicolor Laidlaw, ♀ Type.

viridis Fraser (***Drepanosticta***), 1922. Kimmins, 1966 : 218.

walli Fraser (***Ceylonosticta***), 1931. Kimmins, 1966 : 218.

wheeleri Fraser (***Drepanosticta***), 1942. Kimmins, 1966 : 218.

PROTONEURIDAE

acuta Kimmins (***Elattoneura***), 1938 : 300, figs 6, A–D. Holotype ♂. Nigeria, Lagos (*G.*

Strachan) / Elattoneura acuta ♂ Kimm. Type, det. D. E. Kimmins, 1968.

Apex of abdomen, penis cleared and mounted in canada balsam.

amelia Calvert (***Neoneura***), 1903 : 138, pl. 5, fig. 36, pl. 6, fig. 8. LECTOTYPE ♂. [Guatemala], Vera Paz, Cubilguitz ([*G. C.*] *Champion*) / Neoneura amelia Calvert, P. P. Calvert det. 1903, B.C.A. Neur., p. 138, Orig. of part of pl. 6, fig. 8 / Neoneura amelia Calvert, ♂ Lectotype, D. E. Kimmins det. 1968.

Two examples were the basis of the figures of this species. As the second example is now fragmentary, I have selected the above example (which has carried a Museum type-label for many years) as the Lectotype.

annandalei Fraser (***Caconeura***), 1921. Kimmins, 1966 : 178.

apicalis Fraser (***Chloroneura***), 1924. Kimmins, 1966 : 178.

atrocyana Lieftinck (***Notoneura***), 1960 : 117, figs 1–5. Holotype ♂. N. Dutch New Guinea, Waigeu, Camp Nok, 2500 ft, iv.1938 (*L. E. Cheesman*) / Notoneura atrocyana Lieftinck, ♂ Holotype, det. D. E. Kimmins, 1968.

The original determination labels on the paper envelopes were accidentally destroyed.

auricolor Fraser (ssp. ***Caconeura dorsalis***), 1927. Kimmins, 1966 : 181.

autumnalis Fraser (***Caconeura***), 1922. Kimmins, 1966 : 181.

balli Kimmins (***Elattoneura***), 1938 : 296, figs. 3, A–E. Holotype ♂. Sierra Leone, Bafodea, 13.iv.1912 (*Jas J. Simpson*) / Disparoneura pruinosa Selys, ♂, Determined by H. Campion / Elattoneura balli Kimm. ♂ Type, det. D. E. Kimmins.

banksi Tillyard (***Isosticta***), 1913 : 433–434, pl. 47, fig. 4. LECTOTYPE ♂. N[orth] Q[ueensland], Banks Is., 12.ii.[19]10 (*H. Elgner*) / Isosticta Banksii Till., ♂ Type, R.J.T. / Isosticta banksi Till., ♂ Lectotype, D. E. Kimmins det., 1968.

The spelling of the name 'Banksii' was corrected to 'banksi' in the original publication.

bilineata Fraser (***Melanoneura***), 1922. Kimmins, 1966 : 182.

botti Fraser (***Caconeura***), 1922. Kimmins, 1966 : 183.

burmanensis Fraser (ssp. of ***Caconeura verticalis***), 1933. Kimmins, 1966 : 184.

cacharensis Fraser (ssp. of ***Disparoneura campioni***), 1933. Kimmins, 1966 : 184.

campioni Fraser (***Disparoneura***), 1922. Kimmins, 1966 : 185.

canescens Tillyard (***Neosticta***), 1913 : 435–438, pl. 47, fig. 6. LECTOTYPE ♂. N[ew] S[outh] W[ales], Illawarra, x.[19]07 (*R. J. Tillyard*) / Neosticta canescens Tillyard, ♂ TYPE / Neosticta canescens Till., ♂ Lectotype, D. E. Kimmins, 1968.

canningi Fraser (***Caconeura***), 1919. Kimmins, 1966 : 185.

[***cara*** Calvert (***Protoneura***), 1903 : 143, pl. 5, figs 38, 45, pl. 6, fig. 9.

The specimen in the BMNH from Guerrero, La Venta is fragmentary, and although it was the original of part of pl. 6, fig. 9, in view of the fact that there were two other males in the Calvert collection, I am assuming that the holotype is one of these and have marked our fragmentary ♂ and an incomplete ♀ from Dos Arroyos as paratypes.]

coelestina Tillyard (***Alloneura***), 1906 : 184–186, pl. 17, figs 5a, b. LECTOTYPE ♂. N. Q[ueensland], Cairns, [Redlynch], i.[19]05 (*R. J. Tillyard*) / Alloneura coelestina Till., ♂ TYPE, R.J.T. / Alloneura coelestina Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Notoneura*.

cyaneovittata Fraser (***Esme***), 1922. Kimmins, 1966 : 187.

[***dorrigoensis*** Tillyard (race of ***Neosticta canescens***), 1913 : 437–438. Type not in the collection of Odonata bequeathed to BMNH by Tillyard but is in the Australian National Collection at Canberra (C.S.I.R.O.).]

dorsalis Kimmins (***Elattoneura***), 1913 : 299, text-figs 5, A–E. Holotype ♂. Sierra Leone, Yana, 30.iii.1912 (*Jas J. Simpson*) / Elattoneura dorsalis Kimmins, ♂ Type, det. D. E. Kimmins.

evelynae Lieftinck (**Notoneura**), 1960 : 120, fig. 6. Holotype ♂. N. Dutch New Guinea, Waigeu [Isl.], Camp Nok [Mt Buffelhoorn], 2500 ft, iv.1938 (*L. E. Cheesman*) / lat. stripe pale blue, under thorax and abd. apex light brown [collector's note] / Notoneura evelynae Lieftinck, ♂ Holotype, det. D. E. Kimmins, 1968 [original determination on paper envelope accidentally destroyed].

fieldi Tillyard (**Austrosticta**), 1908 : 765–766, pl. 42, figs 6–9. LECTOTYPE ♂. [Australia], N[orthern] T[erritory], Tennant's Creek, iv.[19]06 (*D. Field*) / Austrosticta Fieldi Till., ♂ TYPE, R.J.T. / Austrosticta fieldi Till., ♂ Lectotype, D. E. Kimmins det. 1968.

filicicola Tillyard (**Oristicta**), 1913 : 438–440, pl. 440, fig. 7. LECTOTYPE ♂. N[orth] Q[ueensland], Cooktown, i.[19]08 (*R. J. Tillyard*) / Oristicta filicicola Till., ♂ TYPE, R.J.T. / Oristicta filicicola Till., ♂ Lectotype, D. E. Kimmins det. 1968.

fletcheri Fraser (**Disparoneura**), 1919. Kimmins, 1966 : 192.

hyperythra Selys (**Alloneura**), 1886 : 180–181. Holotype ♂. Type [McL. label] / Labuan / Alloneura hyperythra Selys, ♂ Borneo.

Currently placed in the genus *Prodasineura*. The type now lacks the right anterior wing.

klugi Cowley (**Protoneura**), 1941 : 145–148, figs 1–24. Holotype ♂. Peru, [Dept. Loreto], Iquitos, v.1938 (*G. C. Klug*) / Protoneura klugi Cowley, ♂ Holotype, det. J. Cowley, 1940. Holotype (with head detached) mounted on card.

longistyla Fraser (**Esme**), 1931. Kimmins, 1966 : 202.

mackwoodi Fraser (**Caconeura**), 1919. Kimmins, 1966 : 202.

marshalli Ris (**Chlorocnemis**), 1921 : 291, pl. 8, fig. 8, text-fig. 20. Lectotype ♂ (Pinhey, 1962 : 104). Mashonaland, Mazoe, 4000 ft, 24.ii.1905 (*G. A. K. Marshall*) / Chlorocnemis nov. spec. Det. Dr F. Ris / Chlorocnemis marshalli Ris, Type, described 1921, det. Miss C. Longfield.

Pinhey, 1962, in effect designated the BMNH example as lectotype. The specimen now has only two wings, one pair possibly retained by Ris.

moultoni Laidlaw (**Disparoneura**), 1912 : 98. Holotype ♂. Sarawak, 11.v.1911 (*J. C. Moulton*) / Disparoneura nov. spec. [Ris' writing] / Disparoneura moultoni Laidlaw, Type ♂.

Currently placed in the genus *Prodasineura*, as a synonym of *P. hyperythra* (Selys).

mudiensis Fraser (**Esme**), 1931. Kimmins, 1966 : 205.

mutata Selys (**Disparoneura**), 1886 : 164–165. LECTOTYPE ♂. Type [McL. label] / Magila / Disparoneura mutata ♂ Selys, Magila / Disparoneura mutata Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Elattoneura glauca* (Selys).

nigra Fraser (**Caconeura**), 1922. Kimmins, 1966 : 206.

nigra Kimmins (**Elattoneura**), 1938 : 297, figs 4, A–E. Holotype ♂. S. Nigeria, Ibadan, 11.iii.[19]19 / Elattoneura nigra Kimm. ♂ Type, det. D. E. Kimmins. /

Penis mounted in canada balsam.

nigripes Selys (**Chlorocnemis**), 1886 : 141. Lectotype ♂ (Gambles, 1967 : 197).

oculata Kirby (**Disparoneura**), 1894 : 562–563. Holotype ♀. [Ceylon], Kottawa, 19.iv. [18]92 [*Yerbury*] / oculata type [WFK].

Currently placed as a synonym of *Elattoneura centralis* Hagen.

pauli Longfield (**Chlorocnemis**), 1936 : 470–471, fig. 2. Holotype ♂. Central Africa, Uganda, Toro Distr., Kibale Forest, 2.iii.1934, By river (*C. E. Longfield*) / Chlorocnemis pauli sp. nov. Type ♂, det. Miss Longfield.

peramans Calvert (**Protoneura**), 1902 : 231; 1903 : 141–142, pl. 5, figs 48, 49. Holotype ♂. Guatemala, Vera Paz, Panima ([*G. C.*] *Champion*) / Protoneura peramans Calv., P. P. Calvert det. 1903, B.C.A. Neur. p. 141, Orig. of Tab. 5, fig. 48.

No type was indicated by Calvert in 1902 in his brief description in society proceedings.

A pair *in coitu* only is referred to and strictly one of these should have been chosen as type. Calvert (1903 : xxviii) states that the types of his new species described in B.C.A. Neur. are the specimens marked as originals of figures, and as the above-mentioned example has been considered as type for many years, I have accepted Calvert as having designated this specimen as type.

peramoena Laidlaw (***Disparoneura***), 1913 : 76–77. LECTOTYPE ♂. Sarawak, Lawas, 15.ix.1909 (*J. C. Moulton*) / Disparoneura peramoena Laidlaw, Type ♂. / Disparoneura peramoena Laidl., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Prodasineura*.

peruviensis Fraser (***Protoneura***), 1946. Kimmins, 1966 : 209.

protostictoides Fraser (***Protoneura***), 1946. Kimmins, 1966 : 210.

ramburi Fraser (***Indoneura***), 1922. Kimmins, 1966 : 211.

remissa Calvert (***Protoneura***), 1903 : 144–145, pl. 5, fig. 43. Holotype ♂ (Calvert, 1903 : xxviii). [Mexico], Tabasco, Teapa, ii (*H. H. Smith*]) / Protoneura remissa Calv., P. P. Calvert det. 1903, B. C. A. Neur. p. 144. Orig. of Tab. V, fig. 43.

Currently placed in the genus *Psaironeura*.

salomonis Selys (***Alloneura***), 1886 : 188, 189. Holotype ♂. Type [McL. label] / Solomon Ids (*Mathew*) / Alloneura salomonis Selys ♂, I. Salomon.

Currently placed in the genus *Notoneura*.

sita Kirby (***Disparoneura***), 1894 : 563. LECTOTYPE ♂ (teneral, lacking head). [Ceylon], Hot Wells, Trincomali, 13.ix.[18]91 ([*Yerbury*]) / sita, type [WFK] / Disparoneura sita Kirby, ♂ Lectotype, D. E. Kimmins det. 1968.

Fraser (1923 : 223) refers to the adult type-specimen in the BMNH and a teneral co-type male. The latter specimen is the one fully described by Kirby and the adult is only very briefly referred to. The teneral specimen bears Kirby's determination label and has been chosen as the type. Currently placed in the genus *Prodasineura*.

solitaris Tillyard (***Alloneura***), 1906 : 182–184, pl. xvii, figs 4a, b. LECTOTYPE ♂. N. Q[ueensland], Kuranda, i.[19]05 (*R. J. Tillyard*) / Alloneura solitaria Till., ♂ TYPE, R.J.T. / Alloneura solitaris Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Notoneura*. The specific name is given four times as *solitaris* in the text but on the type it is spelled *solitaria*.

souteri Fraser (***Disparoneura***), 1924. Kimmins, 1966 : 213.

subnodalis Selys (***Disparoneura***), 1886 : 162, 163. LECTOTYPE ♂. Type [McL. label) / Old Calabar (*R*[*utherford*]) 86 / Disparoneura subnodalis Selys ♂ Old Calabar / Disparoneura subnodalis Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Pinhey, 1962 : 107 quotes ♂ ♀ cotypes in BMNH and 1 damaged ♀ in Brussels, type not designated.

theebawi Fraser (***Caconeura***), 1922. Kimmins, 1966 : 216.

tillyardi Campion (***Isosticta***), 1921 : 38–41, figs 1, 3. Holotype ♂. Mt. Canala, 13.vi.[19]14, Coll. *P. D. Montague*, New Caledonia Exped. / Isosticta tillyardi Campion, ♂ Holotype. Determined by H. Campion.

vittata Selys (***Alloneura*** sg. ***Disparoneura***), 1886 : 174–175. LECTOTYPE ♂. Type [McL. label] / Camaroons (*R*[*utherford*]), 2 / Disparoneura vittata Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Elattoneura*.

wallacei Selys (***Alloneura***), 1886 : 183–184. LECTOTYPE ♂. Type [McL. label] / New Guinea / Alloneura wallacei Selys ♂ / Alloneura wallacei Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

The original description states that it is based upon two specimens, collected by Wallace, one from ? New Guinea, the other from ? Jobi, in coll. Selys. These specimens, with de Selys' labels, were actually in the McLachlan collection (now in BMNH).

PLATYCNEMIDIDAE

alatipes McLachlan (***Psilocnemis***), 1872 : 1–2, 1 text-fig. Holotype ♂. Type [McL. label] / [Interior of] Madagascar / Psilocnemis alatipes McL.

Currently placed in the genus *Platycnemis*.

arachnoides Fraser (***Pseudocopera***), 1922. Kimmins, 1966 : 179.

atomaria Selys (***Psilocnemis***), 1886 : 122–123. LECTOTYPE ♂. Type [McL. label] / Labuan / Ps. atomaria ♂ [Selys' writing] / Psilocnemis atomaria Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

There are two males in the McLachlan collection bearing Selys' identification labels and of these the larger (abdomen, 33 mm) has been chosen as Lectotype. There are also two females, det. McLachlan, from N.W. Borneo, but these have no type labels. Possibly the allotype is in the Selys collection. Currently placed in *Platycnemis*.

bilineata Selys (***Trichocnemis***), 1869 : 28. LECTOTYPE ♂. Type [McL. label] / Seychelles (*Wright*) / Trichocnemis bilineata de Selys ♂ / Hemicnemis bilineata Selys ♂ Seychelles / Trichocnemis bilineata Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

The lectotype ♂ now lacks its head. Currently placed in the genus *Leptocnemis*, as a synonym of *L. cyanops* (Selys).

borneensis Selys (***Trichocnemis***), 1886 : 116. Holotype ♀. Type [McL. label] / North Borneo / Elopura, M[ar]ch, [18]84 / Trichocnemis borneensis S. [McL's writing].

campioni Laidlaw (***Coeliccia***), 1917 : 224–225, text-figs 3–4. Holotype ♂. Borneo, Lio Matu, 31.x.1914 / Coeliccia campioni Type ♂ [Laidlaw's writing].

chaseni Laidlaw (***Calicnemis***), 1928 : 136. Holotype ♂. Jor, Pahang, 4.vi.1922 (*F. Chasen*) / Calicnemis chaseni n. sp. ♂ holotype [Laidlaw's writing].

The original locality label (written in the BMNH Setting Room) erroneously gave F. F. Laidlaw as the collector. This label has been replaced. Currently placed in the genus *Calicnemia*, a replacement name for *Calicnemis* [preocc.]. The anal appendages have been mounted in canada balsam on celluloid.

cyaneothorax Kimmins (***Coeliccia***), 1936 : 89, fig. 10. Holotype ♂. Sarawak, Mt Dulit, R. Koyan, 2500 ft, Primary forest, 18.xi.1932 / Riverside / (*B. M. Hobby & A. W. Moore*) / Coeliccia cyaneothorax, ♂ sp. n., det. D. E. Kimmins.

cyanops Selys (***Trichocnemis***), 1869 : 28. Holotype ♂. Type [McL. label] / Seychelles (*Wright*) / Trichocnemis cyanops ♂ de Selys / Hemicnemis cyanops Selys ♂ Seychelles.

Currently placed in the genus *Leptocnemis*.

dinoceras Laidlaw (***Coeliccia***), 1925 : 562–563, text-figs 2–3. Holotype ♂. Philippines, Mindanao, [Landanao], Kolambugan, 18.v.1914 (*E. A. Wileman*) / Coeliccia dinoceras ♂ Laidlaw.

The type now lacks head and anal appendages.

dorothea Fraser (***Coeliccia***), 1933*b* : 466–467, figs 4a, b; 1936 : vii. LECTOTYPE ♂. TYPE, *C. dorotheae* ♂, Haldibari T[ea] E[state], Duars, Bengal (*H. V. O'Donel*), 30.x.[19]31. det. F. C. Fraser, sp. nov. / Coeliccia dorothea Fraser ♂ Lectotype, D. E. Kimmins det. 1969.

Fraser (1936 : vii) restricted the type to material in BMNH. This species was published as *dorothea*, although Fraser's label gives it as *dorotheae*. This species was accidentally omitted from my 1966 list of Fraser's types, probably during retyping.

flavostriata Laidlaw (***Coeliccia***), 1917 : 223–224, text-figs 1–2. Holotype ♂. Borneo, Mt Merinjak, 28.v.1914 / Coeliccia flavostriata n. sp. ♂ Type [Laidlaw's writing].

fraseri Laidlaw (***Coeliccia***), *in* Fraser, 1932 : 655–656; Laidlaw, 1932*a* : 14, pl. 1, figs 15, 22 ; pl. 2, figs 9–10; pl. 3, fig. 8.

This taxon has a strange history. Strict application of priority of publication would make it *Coeliccia fraseri* Fraser, since a description of it appeared in Fraser's *Indian Dragonflies*, published on 15 Feb. 1932, with reference to Laidlaw, 1931. Laidlaw's paper was delayed and did not appear until March 1932. Fraser states 'type in B.M.' and Laidlaw 'At present in my collection ; the types will be deposited in the British Museum.'

The BMNH has a specimen, presented by Fraser in 1937, with all the labels in Fraser's writing, which he had marked as type; the year of capture does not agree with the description, and I am considering it at present as a possible syntype. I understand that part of Laidlaw's collection was acquired by the late John Cowley, and it is therefore possible that additional syntypes or even the actual type may be amongst his papered material (now in BMNH). I propose therefore to defer any decision on the type of this taxon until it has been possible to examine the Cowley Collection in detail.

hainanense Laidlaw (ssp. ***Coeliccia scutellum***), 1932 : 23. LECTOTYPE ♂. Hainan, Mt Wuchi, 17.v.[19]03 / Coeliccia scutellum hainanense holotype [typewritten] / Coeliccia scutellum hainanense Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1968.

The date of the lectotype was incorrectly published as '19.v.03'.

incisa Kimmins (***Risiocnemis (Prionocnemis)***), 1936 : 91. Holotype ♀. Prionocnemis incisa sp. n. ♀, det. D. E. Kimmins / Risiocnemis incisa Kim., ♀ Holotype, det. D. E. Kimmins, 1969.

This species was published under the name *Risiocnemis* (*Prionocnemis*), as *Risiocnemis* was a newly proposed replacement name for *Prionocnemis* (preocc.).

kimminsi Lieftinck (***Idiocnemis***), 1958 : 270–272, text-figs 56–60. Holotype ♂, New Britain (*A. Willey*), Reg. Mar. 1.1898 / 68 / Idiocnemis nov. spec. Det. Dr. F. Ris / Idiocnemis inornata Selys, det. H. Campion. Figured and described Entom. lii, p. 247 (1919) / Idiocnemis kimminsi Lieft. det. M. A. Lieftinck, 1958, HOLOTYPE.

Lieftinck quotes the number as 89, but by comparison with the allotype ♀, which has the number on the right hand end of the label, I think that the type should be 68.

[***lieftincki*** Laidlaw (***Coeliccia***), 1932 : 32–33. In May 1931, prior to publication, a ♂ and ♀ were presented to BMNH by Laidlaw, who stated in his letter (3.v.1931) '*C. lieftincki* is at present a MSS name.' It was naturally assumed that these were the types and they have been so marked since that date. In the preparation of these type-lists, it was noticed that collecting dates differed from those given in the description, and that the types were stated to be in the Lieftinck Collection. Dr Lieftinck has informed me that he does have the types, and the BMNH examples are therefore merely additional material, not of the type-series. The male is in very poor condition, lacking most of abdomen.]

loogali Fraser (***Coeliccia***), 1932 : 652–653; Laidlaw, 1932*a* : 26–28, pl. I, figs 4, 27, pl. II, 17–18, pl. III, 1. LECTOTYPE ♂. Burma, Maymyo, 31.vii.[19]24 (*Wall*) / Coeliccia loogali Fras. COTYPE / Coeliccia loogali Fraser, ♂ Lectotype, D. E. Kimmins det. 1968.

This taxon is in a position diametrically opposed to that of *Coeliccia fraseri* (q.v.). This was a Fraser MSS name which was intended to be published by Laidlaw but which, through delay in publication was antedated by Fraser himself, and in this case should be attributed to Fraser.

macrostigma Laidlaw (***Coeliccia***), 1918 : 225–227, text-figs 5–6. Holotype ♂. Borneo, Baram, 20.x.[19]10 / Coeliccia macrostigma ♂ Type / Coeliccia macrostigma Laidlaw.

Holotype ♂ specified by Laidlaw as 'Type ♂ in the British Museum'.

montana Fraser (***Coeliccia***), 1931. Kimmins, 1966 : 204.

nemoricola Laidlaw (***Coeliccia (Trichocnemis)***), 1912 : 95–96; 1915 : 37. Lectotype ♂ (by designation of Laidlaw, 1915). Sarawak, Mt Batulawi, 27.v.1911 (*J. C. Moulton*) / Coeliccia (Trichocnemis) nemoricola Laidlaw, ♂ Type [Laidlaw's writing].

I consider that Laidlaw (1915) by his reference to 'The type of C. *nemoricola* . . . to be deposited in the British Museum' in effect designated the example, now in BMNH and labelled by him as ♂ Type, as lectotype, especially as he distinguished the second example as 'Co-type'.

nigrohamata Laidlaw (***Coeliccia***), 1918 : 228. Holotype ♂. Borneo, Mt Merinjak, 26.v. 1914 / Type, Mt Merinjak, 26/5/15 / Coeliccia nigrohamata ♂ Type [Laidlaw's writing] / Coeliccia nigrohamata Laidlaw.

nipalica Kimmins (***Calicnemia***), 1958 : 350–351. Holotype ♂. Nepal, Phewa Tal, nr. Pokhara, 2500 ft, 8.v. 1954 (*J. Quinlan*) / Calicnemia nipalica Kim., ♂ Type, D. E. Kimmins det. 1958.

pachystigma Selys (***Allocnemis***), 1886 : 138–139. LECTOTYPE ♂. Type [McL. label] / Old Calabar, *R*[*utherford*], 72 / Allocnemis pachystigma Selys, ♂ Old Calabar / Allocnemis pachystigma Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Of the four syntypes in the McLachlan collection (2 ♂, Sierra Leone, 2 ♂, Old Calabar), I have chosen the most complete as Lectotype. Currently placed in *Stenocnemis*.

poungyi Fraser (***Coeliccia***), 1924. Kimmins, 1966 : 209.

pruinosa Fraser (***Metacnemis***), 1928. Kimmins, 1966 : 210.

pyriformis (Fraser MS) Laidlaw (***Coeliccia***), 1932 : 26. Holotype ♂. Tonkin, Thai-Nien, Basin of Fleuve Rouge, 21.xii.1924 (*H. Stevens*) / Coeliccia pyriforma sp. nov., ♂ (Type) [in Fraser's writing].

rectangulata Laidlaw (***Calicnemia***), 1932 : 97–98, fig. 2a. LECTOTYPE ♂. Pahang, F.M.S., Cameron Highlands, Kuala Boh, 31.v.[19]31 [no collector's name given] / Calicnemia rectangulata ♂ Type [Laidlaw's writing].

Laidlaw lists two examples but gives no published designation as to holotype. The only example in BMNH is marked Type by him and has been chosen as the Lectotype.

reflexa Kimmins (***Risiocnemis***), 1936 : 92–93, fig. 12. Holotype ♀. N.W. Borneo / Prionocnemis reflexa ♀ sp. n., det. D. E. Kimmins / Risiocnemis reflexa Kim., ♀ Holotype, det. D. E. Kimmins, 1969.

rufipes Selys (***Metacnemis***), 1886 : 139–140. Holotype ♂. Type [McL. label] / Camaroons, *R*[*utherford*] 37 / Alloneura rufipes Selys n. sp. ♂ Camaroons.

Currently placed (with doubt) in *Platycnemis*.

salomonis Kimmins (***Lieftinckia***), 1957 : 314–315, text-fig. 1. LECTOTYPE ♂. Solomon Islands, Guadalcanal, Tapenanje, 10–23.xii.1953 (*J. D. Bradley*) / Lieftinckia salomonis Kimm., ♂ Type, D. E. Kimmins det. 1955 / Lieftinckia salomonis Kim., ♂ Lectotype, D. E. Kimmins det. 1969.

Although the above example was labelled ♂ Type, no type-designation was made in the original description.

scutellum Laidlaw (***Coeliccia***), 1932*a* : 22, pl. III, fig. 18. LECTOTYPE ♂. Tonkin, Bao Ha, 20.ix.[19]23 (*H. Stevens*) / Coeliccia scutella [*sic*] ♂, sp. nov. (Type) [in Fraser's writing] / Coeliccia scutellum Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1968.

Of the two examples listed, only the above lectotype has been traced. The date of this is incorrectly given in the original description as 20.iv.24.

subaequistyla Fraser (***Copera***), 1928. Kimmins, 1966 : 214.

superplatypes Fraser (***Copera***), 1927. Kimmins, 1966 : 215.

COENAGRIIDAE

abercornensis Pinhey (ssp. ***Aciagrion steelae***) 1958 : 103–104, fig. 2. LECTOTYPE ♂. N[orthern] R[hodesia], Abercorn, Lake Chila, iv.1954 (*E. Pinhey*) / Aciagrion steelae aberecornensis Pinhey 1956, TYPE ♂ / Aciagrion steelae abercornensis Pinhey, ♂ Lectotype, D. E. Kimmins det. 1969.

adamsi Calvert (***Argia***), 1901 : 80–81, pl. iv. figs 35, 35s. Holotype ♂. [Panama], Bugaba, 800–1500 ft (*Champion*) / Argia adamsi Calv. COTYPE, P. P. Calvert det. 1901. Original of ff. 35, 35s, pl. iv. B.C.A. Neur.

adytum Perkins (***Agrion***), 1899 : 69. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Kauai, Waimea, 4000 ft, vi.1894 (*Perkins*) / Agrion adytum Prk. / Agrion adytum Prk., Type / Agrion adytum Prk., ♂ Lectotype, D. E. Kimmins det. 1969.

Tenth abdominal segment of lectotype detached and mounted on card. Currently placed in *Megalagrion*.

albistigma Fraser (***Ischnura***), 1927. Kimmins, 1966 : 177.

alcyone Laidlaw (***Agriocnemis***), 1931*a* : 249–250. LECTOTYPE ♂. Brit. N. Borneo, Bettotan, 26.vii.1927 (*H. M. Pendlebury*) / Agriocnemis alcyone ♂ [Laidlaw's writing] / Agriocnemis alcyone Laidl., ♂ Lectotype, D. E. Kimmins det. 1969.

The locality label of this specimen was inaccurate and has been replaced, using information from the original description. The type series comprised 3 ♂, 1 ♀, and the above example was given to BMNH as the holotype, although not labelled as such. It has therefore been designated Lectotype.

aluensis Campion (***Teinobasis***), 1924 : 614, fig. 2. Holotype ♂. Solomon Is., Alu (*C. M. Woodford*) / Teinobasis aluensis Campion, ♂ Holotype, det. D. E. Kimmins, 18.ix.1933.

amaurodytum Perkins (***Agrion***), 1899 : 66–68. LECTOTYPE ♂. Hawaiian Islands / Molotai Mts, 4000 ft +, viii.1893 (*Perkins*) / Agrion amaurodytum Prk. Type / Agrion amaurodytum Perk., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in *Megalagrion*.

angolense Longfield (***Agriocnemis***), 1947 : 15–17, figs 6 A–E. Holotype ♂. Angola M[ission] S[cientifique] S[uisse], 1933 / Sangévé, 11.ii.[1933] / Agriocnemis angolense Type ♂, det. Miss C. Longfield.

There are also allotypes of the homochrome and heterochrome females.

[***apicale*** Selys (***Acanthagrion***), 1876 : 306–307.

This species was based upon three ♂ examples; one from Para (*Bates*) in the Selys Collection and two from Peba in the McLachlan collection. As the name *apicale* was a Bates MSS name, I am considering the ♂ example in the Selys collection as the LECTOTYPE and the BMNH examples as paralectotypes.]

argentea Tillyard (***Agriocnemis***), 1906 : 192–193, pl. 17, figs 10a, b. LECTOTYPE ♂. N. Q[ueensland], Kuranda, xii.[19]04 (*R. J. Tillyard*) / Agriocnemis argentea Till., ♂ TYPE R.J.T. / Agriocnemis argentea Till., ♂ Lectotype, D. E. Kimmins det. 1969.

This species is placed by Fraser (1960) as a synonym of *Agriocnemis exsudans* Selys.

armstrongi Fraser (***Amorphostigma***), 1925. Kimmins, 1966 : 179.

arthuri Fraser (***Mortonagrion***), 1942. Kimmins, 1966 : 179.

asteliae Perkins (***Agrion***), 1899 : 66. LECTOTYPE ♂. Honolulu, Oahu, 3000 ft, vii.1895 (*Perkins*) / Agrion asteliae Prk., Type / Agrion asteliae Perkins, ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in *Megalagrion*.

attenuatum Fraser (***Aciagrion***), 1928. Kimmins, 1966 : 180.

aureofrons Tillyard (***Psuedagrion***), 1906 : 189–191, pl. 17, fig. 8. Lectotype ♂. (Watson 1969 : 71). N[orth] Q[ueensland], Atherton, i.[19]05 (*R. J. Tillyard*) / Pseudagrion aureofrons. ♂ Lectotype, Tillyard, 1906, design by J. A. L. Watson, 1969.

auricolor Fraser (***Amorphostigma***), 1927. Kimmins, 1966 : 180.

[***australis*** Selys (***Agriocnemis***), 1877 : 155–156.

The unique ♀ (Queensland) is said by Selys to be in the McLachlan collection, but it has not been traced.]

azureum Fraser (***Aciagrion***), 1922. Kimmins, 1966 : 181.

beadlei Pinhey (***Pseudagrion***), 1961 : 33–34, pl. 2, fig. 11. Holotype ♂. Uganda, Jinja, vi.1949 (*E. Pinhey*) / Pseudagrion beadlei Pinhey 1956, Type ♂, HOLOTYPE.

bellona Laidlaw (***Ceriagrion***), 1915*a* : 274. Holotype ♂. Sarawak, Mt Matang, 4.xii.1913 (*J. C. Moulton*) / Ceriagrion sp. nov. [H. Campion's writing] ♂ Type [Laidlaw's writing] / Ceriagrion bellona Laidlaw, ♂ Holotype, D. E. Kimmins det. 1969.

bidens Kimmins (***Nesobasis***), 1958*a* : 239–241, figs 1–2. Holotype ♂. New Hebrides, Aneityum, Red Crest, 1200 ft, 3 miles N.E. of Anelgauhat, vi.1955 (*L. E. Cheesman*) / Nesobasis bidens Kim., ♂ TYPE, D. E. Kimmins det. 1957.

bidentatum Fraser (***Ceriagrion***), 1941. Kimmins, 1966 : 182.

blackburni McLachlan (***Megalagrion***), 1883 : 238–239. LECTOTYPE ♂. Type [McL. label] / Hawaiian Islands, [at the head of Wailuku Valley, Mani] (*Blackburn*) / 26 / Megalagrion Blackburni, McL. / Megalagrion blackburni McL., ♂ Lectotype, D. E. Kimmins det. 1969.

The lectotype lacks the apical third of the right fore wing and the whole of the left hind wing.

bradleyi Kimmins (***Teinobasis***), 1957 : 315–316, fig. 2. LECTOTYPE ♂. Solomon Is., Guadalcanal, Tapenanje, 10–23.xii.1953 (*J. D. Bradley*) / Teinobasis bradleyi Kim., ♂ TYPE, D. E. Kimmins det. 1955 / Teinobasis bradleyi Kim., ♂ Lectotype, D. E. Kimmins det. 1969.

Although the type was labelled as such, no holotype was specified in the original description.

brisbanense Tillyard (***Agrion***), 1917 : 477–479, pl. 23, figs 13–14. Holotype ♂. Q[ueensland], Brisbane, [Kedron Brook], 22.i.[19]13 (*R. J. Tillyard*) / Agrion brisbanensis Till., ♂ TYPE, R.J.T.

Currently placed in the genus *Coenagrion*.

buxtoni Fraser (***Ischnura***), 1927. Kimmins, 1966 : 184.

calliphya McLachlan (***Agrion***?), 1883 : 236–237. Holotype ♂. Type [McL. label] / Hawaiian Islands [Lanai, about 2000 ft (*Blackburn*)] / 55 / Agrion? calliphya, McL.

Currently placed in the genus *Megalagrion*.

cardinalis Fraser (***Oxyagrion***), 1946. Kimmins, 1966 : 185.

cardinalis Kimmins (***Ischnura***), 1929 : 224–225, 3 text-figs. Holotype ♂. Society Is., N. Raiatea, 1000 ft, 31.v.1925 ([*L. E.*] *Cheesman*) / Ischnura cardinalis Kimmins, ♂ Type, det. D. E. Kimmins.

castellani Roberts (***Coenagrion***), 1948 : 63–68, 2 text-figs. Holotype ♂. Italy, Rome, Acilia, 1.vi.1946 (*O. Castellani*) / C. castellani Rob. ♂ Type [F. C. Fraser's writing] / Penis detached and mounted on card.

Owing to Dr Roberts' illness, Col. F. C. Fraser undertook the preparation of Roberts' manuscript for press, which is also the reason for the determination label in Fraser's handwriting.

cervula Selys (***Ischnura***), 1876 : 262–263. LECTOTYPE ♂. Type [McL. label] / California (*Edwards*) / 219 / Ischnura cervula Selys ♂ / Ischnura cervula Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

Of the pair mentioned by Selys, the ♂ now lacks abdominal segments 6–10 and the left hind wing. The allotype ♀ also lacks the abdominal segments 6–10 and most of both left wings.

ceylanica Kirby (***Archibasis***), 1891 : 205–206, pl. xx, fig. 4. Holotype ♂. Ceylon, Kandy, viii.1888 (*E. E. Green*) / Kandy, Aug. 88 / A. ceylanica Kb. type.

Currently placed in *Pseudagrion*.

cheesmanae Fraser, (***Ischnura***), *in* Mumford, 1942 : 646, figs 1–3. Holotype ♂. Tahiti, Hitiaa, 10.vii.1925 (*Cheesman* [*L. E.*]) / Ishnura sp. [*sic.*] / I. cheesmani [*sic*] Fraser *in* Mumford (Type), det. F. C. Fraser, 1959. Locality [*sic*] of type given in error as in the Morton colln. F.C.F.

chelata Calvert (***Argia***), 1902 : 88, pl. iv. figs 47, 47s. Holotype ♂. [Costa Rica, Volcan de] Irazu, 6–7000 ft (*H. Rogers*) / Argia Lachrymans H. ♀ [Selys' writing] / Argia chelata Calv. ♂ TYPE, P. P. Calvert det. 1901. Original of ff. 47, 47s, pl. iv, B.C.A. Neur.

circulatum Selys (***Enallagma***), 1883 : 133–135. LECTOTYPE ♂. Type [McL. label] / Japan (*Lewis*) / cobalt blue, 20.viii.[18]81 / Agrion circulatum Selys, ♂ Japon / Enallagma circulatum Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

Although labelled '*Agrion*' by Selys, it was published as '*Enallagma*'.

citrinum Campion (***Ceriagrion***), 1914 : 278–279. Holotype ♂. [S. Nigeria], Lagos, (*Strachan*) / Ceriagrion citrinum Campion, Holotype. Determined by H. Campion.

clauseni Fraser (***Agriocnemis***), 1922. Kimmins, 1966 : 186.

coelestis Longfield (***Pseudagrion***), 1947 : 9–10, fig. 3. Holotype ♂. Angola, M[ission] S[cientifique] S[uisse], 1933 / Mupa, viii / Pseudagrion coelestis Type ♂, det. Miss Longfield.

coeruleiceps Longfield (***Pseudagrion***), 1959 : 19–21, figs 3, d, g, h. Holotype ♂. Nigeria, Vom, Stock Farm, 7.ix.1956 (*R. M. Gambles*) / Pseudagrion coeruleiceps Type ♂, det. Miss Longfield.

coeruleum Tillyard (***Pseudagrion***), 1908 : 739–741, pl. 30, figs 13–14. LECTOTYPE ♂. W. A[ustralia], Perth, i.[19]07 (*R. J. Tillyard*) / Pseudagrion coeruleum Till., ♂ TYPE, R. J. T. / Pseudagrion coeruleum Till., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Austroagrion*.

collopistes Calvert (***Telebasis***), 1902 : 116–117, pl. v, figs 27–28. Holotype ♂. Mexico, Teapa, i (*H. H. S*[*mith*]) / Telebasis collopistes Calv., P. P. Calvert det. 1902, Original of Tab. V, figg. 27, 28.

corallinum Campion (***Ceriagrion***), 1914 : 279–281. Holotype ♂. Sierra Leone, Port Lokko, 1.v.1912 (*J. J. Simpson*) / Ceriagrion corallinum Campn., Holotype. Determined by H. Campion.

crocops Selys (***Pseudagrion***), 1876*a* : 512–513. Holotype ♂. Ménado [Celebes] / Agrion crocops Selys (près de pruinosum) ♂ / Pseudagrion crocops Selys ♂.

cupraurea Calvert (***Argia***), 1902 : 85, pl. iv, figs 24, 42. Holotype ♂. Panama, David (*Champion*) / Argia cupraurea Calv. ♂, P. P. Calvert det. 1901, Original of f. 42, pl. iv. B.C.A. Neur.

deceptor McLachlan (***Agrion?***), 1883 : 235–236. Holotype ♂. Type [McL. label] / Hawaiian Islands [Oahu, (*Blackburn*)] / 67 / Agrion? deceptor McL.

Currently placed in the genus *Megalagrion*.

decoloratum Fraser (***Libyagrion***), 1928. Kimmins, 1966 : 188.

descendens Fraser (ssp. ***Acanthagrion apicale***), 1946. Kimmins, 1966 : 189.

digiticollis Calvert (***Telebasis***), 1902 : 118, pl. v, fig. 21. Holotype ♀. [Mexico], Tabasco, Teapa, i (*H. H. S*[*mith*]) / Telebasis digiticollis Calv. P. P. Calvert det. 1902. Original of Tab. v, fig. 21.

dolorosa Fraser (***Pacificagrion***), 1953. Kimmins, 1966 : 189.

[***dorothea*** Fraser (***Coenagrion***), 1923 : 462–463, figs. 8–8c.

A female example in BMNH has been labelled Allotype, since there was only one female in the type-series. The male type presumably went to the Indian Museum collection, although Fraser does not mention the location of any types. It may be mentioned that the specific name is pre-occupied by *Coenagrion dorothea* (Fourcroy, 1785).]

[***draconis*** Barnard (var. of ***Pseudagrion kersteni***), 1937 : 213–215, fig. 14 g.
The BMNH has one example, received from Barnard, labelled 'kersteni var. draconis Type'. Pinhey (1964 : 26–27) has studied ♂, ♀ types and describes a 'holotype ♂' and 'allotype ♀'. I regard his action as in effect designating a ♂ lectotype, and our example is therefore only one of the type-series.]

dubium Laidlaw (***Pseudagrion***?), 1912 : 97–98, fig. 5. Holotype ♂. [Sarawak], Mt Batu Lawi, 27.v.[19]11, Pseudagrion [deleted] Stenagrion dubium Type ♂ [in Laidlaw's writing] / Gen. spec ? (Pseudagrion ??).
Currently placed in the genus *Stenagrion*.

dundoense Longfield (***Pseudagrion***), 1959 : 24–25, fig. 2. Holotype ♂. N. Angola, Lunda Prov., Dundo, iii.1949 / Pseudagrion dundoense Type ♂, det. Miss C. Longfield.

ecornutum Selys (***Agrion***), 1872 : 44–45. LECTOTYPE ♂. Type [McL. label] / Amur Land / 272 / Agrion ecornutum de Selys ♂ / Agrion ecornutum Selys, ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in *Coenagrion*.

eudytum Perkins (***Agrion***), 1899 : 68. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Kauai, Lihue, [about 1000 ft], 1896 (*Perkins*) / Agrion eudytum ♂ Prk., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in *Megalagrion*.

euphorbia Fraser (ssp. ***Argia extranea***), 1966. Kimmins, 1966 : 191.

exclamationis Campion (***Austroagrion***), 1915 : 106–108, 1 fig. Holotype ♂. [Australia], N[orthern] T[erritory], Koolpinyah, 6.iii.[19]13 (*G. F. Hill*) / I[mperial] B[ureau of] E[ntomology] 421 / Austroagrion exclamationis Cmpn., ♂ Holotype, Determined by H. Campion.

fallax Perkins (var. of ***Agrion amaurodytum***), 1899 : 67–68. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Hawaii, Kauai, 4000 ft, x.1896 (*Perkins*) / Agrion amaurodytum, var. of var. peles Prk. / Set out as type of *fallax* by C. H. Kennedy. Fallax types missing & Perkins suggested they might be under *peles*. = *fallax* description and is marked by Perkins as 'var. of var. peles.' See top label [Kennedy's writing] / Agrion amaurodytum var. fallax Prk., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in *Megalagrion*.

floridense Fraser (ssp. ***Acanthagrion gracile***), 1946. Kimmins, 1966 : 192.

forficula Fraser (ssp. ***Argia extranea***), 1946. Kimmins, 1966 : 193.

fragilis Tillyard (***Ischnura***), 1906 : 186–187, pl. 17, figs 6a, b. LECTOTYPE ♂. N[orth] Q[ueensland], Atherton, i.[19]05 (*R. J. Tillyard*) / Aciagrion fragilis Till., ♂ TYPE, R.J.T. / Ischnura fragilis Till., ♂ Lectotype, D. E. Kimmins det. 1969.
Although originally described as *Ischnura*, Tillyard appears to have written new determination labels when he transferred the species to *Aciagrion* in 1912. The lectotype now lacks the right fore wing.

gangetica Laidlaw (***Ischnura***), 1913*a* : 235–236, text-fig. Holotype ♂. N. India, Shamket, Kamaon, 16.v.[19]12 (*A. D. Imms*) / For. Zool. Coll., Shamket, Kamaon, 16.v.1916 / Ischnura gangetica Type ♂ [Laidlaw's writing].
The type was returned to the Forest Research Institute and subsequently presented to BMHN by Dr. A. D. Imms. Currently placed as a synonym of *Ischnura forcipata* Morton.

gautama Fraser (***Indagrion***), 1922. Kimmins, 1966 : 194.

granti McLachlan (?***Ischnura***), 1903 : 402, pl. 24a, figs 1–2. LECTOTYPE ♂. Sokotra, Dahamis, —— feet, 19.xi.[18]98 (*W. R. O. Grant*) / Ischnura granti TYPE ♂ / Ischnura (?) granti McL., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in the genus *Enallagma*.

guichardi Kimmins (**Pseudagrion**), 1958 : 351–352, figs 1–2. Holotype ♂. Ethiopia, nr Cencia, 29.iii.1948 (*K. M. Guichard*) / Pseudagrion guichardi Kim., ♂ TYPE, D. E. Kimmins det. 1958.

haemastigma Fraser (**Ischnura**), 1927. Kimmins, 1966 : 194.

hamulata Fraser (**Argia**), 1946. Kimmins, 1966 : 194.

hawaiiense McLachlan (**Agrion**?), 1883 : 232–234. LECTOTYPE ♂. Hawaiian Islands / 66 ♂ / [Oahu, at no great elevation above the sea (*Blackburn*)] / Agrion? hawaiiense McL. / Agrion? hawaiiense McL., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Megalagrion*. McLachlan quotes 'No. 16', but this must be a printer's error as the three syntypes are numbered '66'.

herberti Calvert (**Argia**), 1902 : 82, pl. iv. figs 37, 37s. Holotype ♂. [Mexico], Guerrero, Amula, 6000 ft (*H. H. Smith*) / Argia herberti Calv. ♂ Type, P. P. Calvert det. 1901. Original of ff. 37, 37s, B.C.A. Neur.

heterogamias Perkins (**Agrion**), 1899 : 77, pl. v, fig. 3. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Kauai, Waimea, 4000 ft, v.1894 (*Perkins*) / Agrion heterogamias Prk., ♂ Type / Agrion heterogamias Prk., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in *Megalagrion*.

huallaga Fraser (**Argia**), 1946. Kimmins, 1966 : 196.

hyacinthus Tillyard (**Agriocnemis**), 1913 : 457–459, pl. 48, figs 15, 16. LECTOTYPE ♂. N[ew] S[outh] W[ales], Sydney, 12.xii.[19]08 (*R. J. Tillyard*) / Agriocnemis hyacinthus Till., ♂ TYPE, R.J.T. / Agriocnemis hyacinthus Till., ♂ Lectotype, D. E. Kimmins det. 1969.

ignifer Tillyard (**Pseudagrion**), 1906 : 188–189, pl. 17, figs 7a, b. LECTOTYPE ♂. N[orth] Q[ueensland], Kuranda, xii.[19]04 (*R. J. Tillyard*) / Pseudagrion ignifer Till., ♂ TYPE, R.J.T. / Pseudagrion ignifer Till., ♂ Lectotype, D. E. Kimmins det. 1969.

ignitum Campion (**Ceriagrion**), 1914 : 281–282. Holotype ♂. Gold Coast, Aburi, 1912–13 (*W. H. Patterson*) / 628 / Ceriagrion ignitum Campion, ♂ Holotype, Determined by H. Campion.

immsi Laidlaw (**Enallagma**), 1913*a* : 236–237, 1 text-fig. Holotype ♂. India, Centr[al] Prov[inces], Sonder Bhandara, 5.xii.1912 (Dr *A. D. Imms*) / For. Zool. Coll. Sonder Bhandara, 5.xii.1912 / Ischnura immsi Type ♂ [Laidlaw's writing].

Holotype returned to Indian Forest Research Institute and subsequently presented to BMNH by Dr Imms. Currently placed as a synonym of *Enallagma sparsum* Selys.

indicatrix Calvert (**Argia**), 1901 : 82–83, pl. iv, figs 23, 39, 39s. Holotype ♂. [Mexico], Tabasco, Teapa, ii (*H. H. S[mith]*) / Argia indicatrix Calv. ♂ TYPE, P. P. Calvert det. 1901. Original of ff. 39, 39s, pl. iv, B.C.A. Neur.

indicum Fraser (**Pseudagrion**), 1924. Kimmins, 1966 : 197.

infrequentula Fraser (**Argia**), 1946. Kimmins, 1966 : 197.

interrupta Fraser (**Agriocnemis**), 1927. Kimmins, 1966 : 198.

interruptum Selys (**Acanthagrion**), 1876 : 314–316. LECTOTYPE ♂. Valparaiso / 13? / Acanthagrion interruptum Selys ♂ [Selys label] / Acanthagrion interruptum Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

The McLachlan collection contained 2 ♂ examples (one incomplete) labelled Valparaiso, and 2 ♂, 1 ♀ labelled Chili. They did not bear McLachlan type labels, but as Selys does not mention any examples in his own collection, the lectotype has been chosen from the two from Valparaiso. The other examples are considered as paralectotypes.

jacksoni Pinhey (**Pseudagrion**), 1961 : 37–38, pl. 2, figs 1, 10. Holotype ♂. Uganda, Aswa R[iver], Karamoja, iii.[19]52 (*T. H. E. Jackson*) / Pseudagrion jacksoni Pinh., HOLOTYPE [♂].

jugorum Perkins (***Agrion***), 1899 : 72–73, pl. v, figs 2, 11, 11a. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / West Maui Mts, 4000 ft, iv.1894 (*Perkins*) / A. jugorum, 12 / Agrion jugorum Prk., Type / Agrion jugorum Perk., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in *Megalagrion*.

kauaiense Perkins (***Agrion***), 1899 : 75–76. ♂ LECTOTYPE. Hawaiian Islands (*R. C. L. Perkins*) / A. kauaiense / Agrion Kauaiense Perk., Type / Agrion kauaiense Prk., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Megalagrion*.

kibalense Longfield (***Pseudagrion***), 1959 : 22–23, fig. 1. Holotype ♂. Central Africa, Uganda, Toro Dist., Kibale Forest, Buzirasagama, 21.i.1938 (*C. E. Longfield*) / Pseudagrion kibalense Longfield, ♂ Type, det. Miss C. Longfield.

lachrymosa Fraser (***Pacificagrion***), 1926. Kimmins, 1966 : 200.

laidlawi Kimmins (***Teinobasis***), 1936 : 95–97, figs 13, 14. Holotype ♂. Brit[ish] N[orth] Borneo, Bettotan, 23.vi–17.viii.[19]27 (*C. B[oden] K[loss] & H. M. P[endlebury]*) / Teinobasis sp. n.?, compared with type of T. kirbyi Laidl. ♂, 4.ii.1935, J. Cowley / Teinobasis laidlawi Kimmins ♂, det. D. E. Kimmins / Teinobasis laidlawi Kim., ♂ Holotype, D. E. Kimmins det. 1969.

[***lanceolatum*** Selys (***Agrion***), 1872 : 43–44. In the BMNH are three rather battered syntypes from the McLachlan collection. In view of their condition, it seems that a lectotype should be selected from material in the Selys Collection.]

laterale Selys (***Acanthagrion***), 1876*a* : 317–319. LECTOTYPE ♂. New Granada (*Nolcken*) / Acanthagrion laterale de Selys ♂ / Acanthagrion laterale Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

leoninum Selys (***Argiagrion***), 1876*a* : 530–531. Holotype ♀. Type [McL. label], Sierra Leone, 32 [3 labels on one card] / Telebasis leonina de Selys / Argiagrion Leoninum Selys ♀.

The holotype now possesses only the right mid leg.

leptodemas Perkins (***Agrion***), 1899 : 70. Holotype ♂. Hawaiian Islands (*R. C. L. Perkins*) / Oahu, Halemano, 2000 ft, ii.1893 (*Perkins*) / A. leptodemas / Agrion leptodemas Prk. Type.

Currently placed in *Megalagrion*.

leveri Kimmins (***Nesobasis***), 1943 : 698–700, 5 figs. Holotype ♂. Fiji, Nadarivatu, 17.i.[1943] (N.154) (*R. A. Lever*) / Nesobasis leveri Kim., ♂ TYPE, det. D. E. Kimmins, vii.1943.

longfieldae Fraser (***Enallagma***), 1947. Kimmins, 1966 : 201.

[***louisae*** Laidlaw (***Amphicnemis***), 1913 : 71. There is in BMNH the female syntype, which now lacks the apex of the abdomen. I have no information as to the location of the ♂ syntype. It is possible that it may have passed into the John Cowley collection from Laidlaw, and I therefore refrain from designating a lectotype until the Cowley Collection (now in BMNH) can be thoroughly examined.]

lyelli Tillyard (***Agrion***), 1913 : 449–451, pl. 49, figs 1, 2, 20. LECTOTYPE ♂. Vic[toria], Gisborne, 22.xii.[19]08 (*R. J. Tillyard*) / Agrion lyelli Tillyard, ♂ TYPE, R. J. T. / Agrion lyelli Till., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Coenagrion*.

maclachlani Selys (***Agriocnemis***), 1877 : 152–153. LECTOTYPE ♂. Type [McL. label] / Gaboon / 249 / Agriocnemis MacLachlani de Selys [Selys' writing] / Agriocnemis maclachlani Selys ♂ Lectotype, D. E. Kimmins det. 1969.

Selys states that a couple were given to him by McLachlan, but he must have seen more examples, because McLachlan's collection contains 2 ♂, 1 ♀ bearing Selys' labels.

madelenae Laidlaw (***Amphicnemis***), 1913 : 71. LECTOTYPE ♂. Sarawak, Matang Road, 11.xi.[19]09 (*J. C. Moulton*) / Amphicnemis madelenae Laidlaw ♂ Type / Amphicnemis madelenae Laidl., ♂ Lectotype, D. E. Kimmins det. 1969.

The lectotype now lacks its head.

magnanimum Selys (***Pseudagrion***), 1876*a* : 516–517. Holotype ♂. Aru / Telebasis magnanimum De Selys ♂ / Pseudagrion magnanimum Selys ♂.
Currently placed in the genus *Papuagrion*.

makoka Fraser (***Argia***), 1946. Kimmins, 1966 : 202.

malabaricum Fraser (***Pseudagrion***), 1924. Kimmins, 1966 : 203.

maldivense Laidlaw (***Enallagma***), 1902 : 221–222. LECTOTYPE ♂ (very incomplete). Maldives, Hulule, 20.vi.[19]00 (*Gardiner*) / Enallagma(?) maldivense sp. n. Type [Laidlaw's writing] / Enallagma(?) maldivense Laidl., ♂ Lectotype, D. E. Kimmins det. 1969.
The lectotype now consists of the thorax and the right posterior wing. There is also a ♀ paralectotype, lacking head and apex of abdomen. These examples have lost their BM register labels, so that there is no record as to how or when they came to the Museum.

malekulana Kimmins (***Nesobasis***), 1936*a* : 73–74, figs. 5–6. Holotype ♂. New Hebrides, Malekula, Ounua, iii–iv.1929 (*L. E. Cheesman*) / Nesobasis malekulana sp. n., ♂ Holotype, det. D. E. Kimmins.

melanicterum Selys (***Pseudagrion***), 1876*a* : 492–493. LECTOTYPE ♂. S[ierra] Leone / Pseudagrion melanicterum Selys, D. E. Kimmins det. 1961. I believe this to be the ♂ type / Pseudagrion melanicterum Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

melidora Lieftinck (***Palaiargia***), 1953 : 241–244, fig. 4. Holotype ♂. N. Dutch New Guinea, Waigeu, Camp Nok, 2500 ft, iv.1938 (*L. E. Cheesman*) / lat. stripes of thorax pale gr[een], dorsally blue, mac[ulae] of Abd[omen] blue / Palaiargia melidora Lft., ♂ HOLOTYPE.

microdemas Perkins (ssp. ***Agrion calliphya***), 1899 : 71. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Hawaii, Kona, 3000 ft, ix.1892 (*Perkins*) / Agrion calliphya McLach. race microdemas = Hawaii specimens / Agrion calliphya var. microdemas Prk. / Agrion calliphya var. microdemas Perk., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in *Megalagrion*.

mildredae Fraser (***Ischnura***), 1927. Kimmins, 1966 : 204.

miniopsis Selys (***Oxyagrion***), 1876 : 299–300. Holotype ♂. Bogota (*Nolcken*) / Telebasis miniopsis Selys ♂ / Oxyagrion miniopsis Selys ♂ / Oxyagrion miniopsis Selys, ♂ Holotype, D. E. Kimmins det. 1969.
This example was not labelled Type by McLachlan and was only recognized as the holotype during the preparation of this type-list.

mishuyaca Fraser (***Argia***), 1946. Kimmins, 1966 : 204.

mollusca Fraser (***Argia***), 1946. Kimmins, 1966 : 204.

molokaiense Perkins (***Agrion***), 1899 : 73. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Molokai Mts, 4000 ft (*Perkins*) / A. molokaiense / Agrion molokaiense Prk. Type / Agrion molokaiense Prk., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in the genus *Megalagrion*.

monardi Longfield (***Pseudagrion***), 1947 : 12–15, fig. 5. Holotype ♂. Angola, Miss[ion] sc[ientifique] suisse, 1932–33 / Ebanga, xi / Pseudagrion monardi Type ♂, det. Miss C. Longfield.

moorei Longfield (***Ceriagrion***), 1952 : 44–46, fig. 3. Holotype ♂. Gold Coast, N. Territories, Yapi, (*J. J. Simpson*) / Ceriagrion moorei sp. n. Type ♂, det. Miss C. Longfield / figured.

[***nahuana*** Calvert (var. of ***Argia agriodes***), 1902 : 99, pl. 4, fig. 62ss.
There is a series of cotypes in BMNH, but none has an indication that it was the original of pl. 4, fig. 62ss, and therefore the type must be in some other collection.]

naia Fraser (***Agriocnemis***), 1932. Kimmins, 1966 : 205.

nesiotes Perkins (***Agrion***), 1899 : 72. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Hawaii, Puna, xii.1896 (*Perkins*) / Agrion nesiotes Prk. / Agrion nesiotes Prk., Type /

Agrion nesiotes Prk., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in *Megalagrion*.

nigra Campion (***Teinobasis***), *in* Laidlaw, 1928 : 136–138, figs 2, 3. Holotype ♂. [Philippines], Luzon, Mt Makiling (*Baker*) / Teinobasis nigra, ♂ Holotype, Determined by H. Campion.

nigroflavum Fraser (***Ceriagrion***), 1933. Kimmins, 1966 : 206.

nigrolineatum Perkins (var. of ***Agrion nigrohamatum***), 1899 : 65. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Oahu, Waianae Mts, iv.1892 (*Perkins*) / A. nigrohamatum Blk., race nigrolineatum / Agrion nigrohamatum var. nigrolineatum Prk. / Agrion nigrohamatum var. nigrolineatum Prk., ♂ Lectotype, D. E. Kimmins det. 1969.
Although not marked as Type by Perkins, the example designated as Lectotype bears a manuscript determination label and has for many years been labelled as type in the BMNH. Currently placed in *Megalagrion*.

novaehispaniae Calvert (ssp. ***Enallagma coecum***), 1907 : 381. Holotype ♂. Vera Cruz, Atoyac, iv (*H. H. S*[*mith*]) / Enallagma coec[um] nov[ae] hisp[aniae] Calv. P. P. Calvert det. 1907. B.C.A. Neur. p. 381 (113). TYPE.

obsoletum Selys (***Leptagrion***?), 1876*b* : 985–986. LECTOTYPE ♂. Obydos (*Traill*), 24.i.[18]74 / Leptagrion obsoletum Selys, ♂ Obydos / Leptagrion ? obsoletum Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

oceanicum McLachlan (***Megalagrion***), 1883 : 239–240. Holotype ♂. Type [McL. label] / Hawaiian Islands [Oahu, at no great elevation above the sea (*Blackburn*)] / 67 / Megalagrion oceanicum, McL.

[***olivaceum*** Laidlaw (***Ceriagrion***), 1914 : 345–346, pl. 16, fig. 9.
The BMNH has a pair, marked cotypes. The types however should be in the Indian Museum and our examples are considered as paratypes.]

oresitrophum Perkins (***Agrion***), 1899 : 60–70. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Kauai, Halemanu, 4000 ft, v.1895 (*Perkins*) / Agrion oresitrophum Prk., Type / A. oresitrophum / Agrion oresitrophum Prk., ♂ Lectotype, D. E. Kimmins, det. 1969.
Currently placed in *Megalagrion*.

orobates Perkins (***Agrion***), 1899 : 70. Holotype ♂. Hawaiian Islands (*R. C. L. Perkins*) / Kauai, Waimea, v.1894 (*Perkins*) / Agrion orobates Perk., Type.
Currently placed in *Megalagrion*.

pacificum McLachlan (***Agrion***?), 1883 : 234–235. LECTOTYPE ♂. Type [McL. label] / Hawaiian Islands [Lanai and Maui (incorrectly Oahu), at various elevations] / 53 / Agrion? pacificum McL. / Holotype, C. H. Kennedy. Sept. 1925 / Agrion ? pacificum McL., ♂ Lectotype, D. E. Kimmins det. 1969.
I have chosen as Lectotype the ♂ labelled holotype by Kennedy, 1925, and which has for many years carried a BM Type label. Currently placed in the genus *Megalagrion*.

pallens Calvert (var. ***Argia violacea***), 1902 : 98, pl. iv. figs 25, 61, 61s. Allotype ♀. [Mexico], Guadaljara, Jalisco, vii (*Schumann*) / Argia violacea pallens Calv., ♀ Cotype, P. P. Calvert det. 1901. Original of fig. 25, pl. iv, B.C.A. Neur.
Although Calvert labels this cotype, in common with others of the type-series, as the original of a figure, I consider it as allotype ♀.

pallidum Fraser (***Ceriagrion***), 1933. Kimmins, 1966 : 208.

paludensis Fraser (***Aciagrion***), 1922. Kimmins, 1966 : 208.

peles Perkins (var. ***Agrion amaurodytum***), 1899 : 67. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Hawaii, Kau, 4000 ft, ix.1895 (*Perkins*) / Agrion amaurodytum Prk., race peles Prk. / Agrion amaurodytum var. peles Prk. Type / Agrion amaurodytum var. peles Perk., ♂ Lectotype, D. E. Kimmins det. 1969.
Currently placed in *Megalagrion*.

pendleburyi Laidlaw (**Ceriagrion**), 1931 : 198–200, fig. 6. LECTOTYPE ♂. F[ederated] M[alay] S[tates], Perak, Batang, Jor Camp, 1800 ft, 1.vi.1923 (*H. M. Pendlebury*) / ♂ ♀ in cop. / Ceriagrion pendleburyi Types ♂ ♀ / Ceriagrion pendleburyi Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1969.

The lectotype ♂ and allotype ♀ both now lack the apical segments of the abdomen, and the right fore wing of the lectotype is also missing.

percellulata Calvert (**Argia**), 1902 : 74–75, pl. iv, figs 5, 27. Holotype ♂. [Mexico], Vera Cruz, Atoyac, v (*H. H. S[mith]*) / Argia percellulata Calv. ♂ COTYPE, P. P. Calvert det. 1901. Original of f. 27, pl. iv, B. C. A. Neur.

Although this example is labelled COTYPE, it is to be considered as holotype by Calvert's statement (1908 : xxviii) 'The type specimens of the new forms described in this work are those which have been figured on the Plates, the male preferably to the female . . .'

[**perparva** McLachlan Mss, *in* Selys (**Ischnura**), 1876 : 263–265.

LECTOTYPE ♂. Texas occ[identale] / Ischnura perparva McLachl. ♂ [Selys' writing] / Ischnura perparva McL., ♂ Lectotype, D. E. Kimmins det. 1969.]

McLachlan's collection contained two battered syntypes (1 ♂, 1 ♀), although they were not marked Type by him. By courtesy of Dr G. Demoulin, I have seen two more syntypes from the Selys collection in Brussels, an incomplete ♂ and a complete ♀. Of the two, I have chosen as Lectotype the Brussels ♂, as it is the more mature. Abdominal segments 5–10, one anterior, one median and both posterior legs are missing.

platystigma Fraser (**Ceriagrion**), 1951. Kimmins, 1966 : 209.

plana Calvert (var. **Argia vivida**), 1902 : 96, pl. iv, fig. 58. Holotype ♂. [Mexico], Guerrero Sierra de la Aguas Escondidas, vii (*H. H. Smith*) / Argia vivida plana Calv., ♂ COTYPE, P. P. Calvert det. 1901. Original of f. 58, pl. iv., B.C.A. Neur.

popoluca Calvert (**Argia**), 1902 : 82, pl. iv, figs 38, 38s. Holotype ♂. [Mexico], Tabasco, Teapa, iii (*H. H. Smith*) / Argia popoluca Calv. ♂ TYPE, P. P. Calvert det. 1901. Original of ff. 38, 38s, pl. iv, B.C.A. Neur.

praeclarum Fraser (**Pseudagrion**), 1924. Kimmins, 1966 : 209–210.

prothoracicum Kimmins (**Telagrion**), 1945 : 187–189, 3 figs. Holotype ♂. Ecuador, Intaj / Telagrion prothoracicum Selys, n. sp., ♂ [Selys' writing] / Telagrion prothoracicum Kim., ♂ TYPE.

pruinescens Tillyard (**Agriocnemis**), 1906 : 191–192, pl. 17, fig. 9a. LECTOTYPE ♂. N[orth] Q[ueensland], i.[19]05 (*R. J. Tillyard*) / Agriocnemis pruinescens Till., ♂ TYPE, R.J.T. / Agriocnemis pruinescens Till., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Ischnura*.

pseudelongatum Longfield (**Enallagma**), 1936 : 475–477, figs 3, 4. Holotype ♂. Central Africa, Uganda, Kigezi Dist., Birunga Mts, swamp in bamboo forest, 7500 ft, 8.iii.1934 (*C. E. Longfield*) / Enallagma pseudelongatum sp. nov., Type ♂. E in cop. with F, det. Miss C. Longfield.

quadrigerum Selys (**Agrion**), 1883 : 136–138. LECTOTYPE ♂. Type [McL. label] / Japan (*Pryer*) / 145 / Agrion quadrigerum Selys, Japon / Agrion quadrigerum Selys, ♂ Lectotype, D. E. Kimmins det. 1969.

The ♂ lectotype has had the 7–10 segments of the abdomen re-attached with glue at some time, probably by McLachlan. It differs from the original description in having a forked black mark at the apex of the 8th segment, as in *sieboldi*. We have in our collection an example labelled by Asahina 'Cercion sieboldii Selys = quadrigerum Selys, det. Asahina, 1953' so presumably this is a variable character.

Currently placed as a synonym of *Cercion sieboldi* (Selys), 1876.

rajah Laidlaw (***Teinobasis***), 1912 : 97. LECTOTYPE ♂. Sarawak, Limbang, 22.vi.1911 (*J. C. Moulton*) / Teinobasis rajah ♂ Type [Laidlaw's writing] / Teinobasis rajah Laidlaw, ♂ Lectotype, D. E. Kimmins det. 1969.

I have no information as to the location of the second syntype ♂.

[***ranauense*** Schmidt (ssp. ***Pseudagrion pruinosum***), 1934 : 348, fig. 47b.

There is in BMNH a ♂ labelled 'Typus', which was presented in 1934 by Dr F. F. Laidlaw. It has been labelled 'Type' but I consider that it can be no more than a syntype, probably only a paratype.]

rarum Longfield (***Ischnuragrion***), 1947 : 6–9, figs 1–2. Holotype ♂. Angola Miss[ion] sc[ientifique] suisse, 1932–1933 / Lunda, ix / Ischnuragrion rarum, ♂ genotype, det. Miss C. Longfield.

remiger Laidlaw (***Amphicnemis***), 1912 : 96–97. Holotype ♂. Sarawak, Kuala Madalam, Limbang R., 11.v.1911 (*J. C. Moulton*) / Amphicnemis remiger Laidlaw, ♂ Type [Laidlaw's writing].

rhoadsi Calvert (***Argia***), 1902 : 92, pl. iv, figs 55, 55s. Holotype ♂. Mex[ico], Nuevo Leon, Monterey, 25.iv.1899 (*Rhoads*) / Argia rhoadsi Calv., ♂ TYPE, P. P. Calvert det. 1901. Original of ff. 55, 55s, pl. iv, B.C.A. Neur.

rogersi Calvert (***Argia***), 1901 : 83, pl. iv, figs 40, 40s. Holotype ♂. Costa Rica, Caché (*H. Rogers*) / Argia rogersi Calv. ♂ Type, P. P. Calvert det. 1901. Original of ff. 40, 40s, pl. iv, B.C.A. Neur.

rubricauda Tillyard (***Agriocnemis***), 1913 : 459–460, pl. 47, fig. 8, pl. 48, figs 17, 18. LECTOTYPE ♂. N[orth] Q[ueensland], Cookham, xii.[19]07 (*R. J. Tillyard*). Agriocnemis rubricauda Till., ♂ Lectotype, D. E. Kimmins det. 1969.

rubroviridis Pinhey (***Pseudagrion***), 1956 : 23–24, text-figs 2, 3. Holotype ♂. N[orthern] R[hodesia], Livingstone, [Maramba River, near] Victoria Falls, x.1953 (*E. Pinhey*) / Male and Female in Copula / Pseudagrion rubroviridis Pinh., HOLOTYPE.

rufocinctum Pinhey (***Pseudagrion***), 1956 : 24–26, text-figs 3, 4. Holotype ♂. Uganda, Kamengo, 13.v.1952 (*E. Pinhey*) / Face & thorax above orange-red; sides of thorax green / Pseudagrion rufocinctum Pinh. 1954, HOLOTYPE.

rufostigma Longfield (***Pseudagrion***), 1947 : 11–12, fig. 4. Holotype ♂. Angola, Miss[ion] sc[ientifique] suisse, 1932–1933 / Sangévé, ii / Pseudagrion rufostigma Type ♂, det. Miss C. Longfield.

samoensis Fraser (***Pseudagrion***), 1925. Kimmins, 1966 : 212.

sobrina McLachlan (***Telebasis***), 1873 : 37–37. Holotype ♂. Type [McL. label] / New Zealand / Telebasis sobrina McL. / Xanthagrion sobrinum McLach. ♂ [Selys label].

Currently placed in *Xanthocnemis*.

somalicum Longfield (***Enallagma***), 1931 : 277–278, 2 text-figs. Holotype ♂. Brit. Somaliland : Marojeh, 10.54 N., 48.59 E., 2250 ft, 5–7.xi. (*C. L. Collenette*) / Flying over waterhole / Enallagma somalicum Longf., ♂ Holotype, D. E. Kimmins det. 1969.

[***spencei*** Fraser (***Pseudagrion***), 1922. Kimmins, 1966 : 214. Holotype ♀ not traced.]

steelae Kimmins (***Aciagrion***), 1955 : 109–110, fig. 1. Holotype ♂. N[orthern] Rhodesia, Lake Bangweulu, near Monfuli, from stream, 1.x.1946 (*M. Steele*) / Aciagrion steelae, ♂ Type, D. E. Kimmins det. 1955.

stellatum Martin (***Pseudagrion***), 1915 : 46–49. LECTOTYPE ♂. British East Africa, Edge of Kenia Forest, SE Side, 7.ii.1911 (*J. T. Anderson*) / Pseudagrion stellatum R. Martin, ♂ type [Martin's writing] / Pseudagrion stellatum Martin ♂ Lectotype, D. E. Kimmins det. 1969.

Martin states that the description was based on material sent to him by Campion and that the ♂ types are in BMNH and Martin collections. Under these circumstances, the lectotype should be selected from the BMNH material and I have chosen the one which has for years carried a BM type label.

Currently placed as a synonym of *Ps. bicoerulans* Martin.

talamanca Calvert (***Argia***), 1907 : 371, pl. viii, figs 34, 34s. Holotype ♂. Costa Rica, Carillo (*Underwood*) / Costa Rica, Carillo (*C. F. Underwood*) / Argia talamanca Calvert, ♂ Type. Orig of figs 34, 34s, pl. viii, B.C.A. Neur.

tarascana Calvert (***Argia***), 1902 : 90–91, pl. iv, figs 14, 51s, 51ss. Holotype ♂. Mexico, [Guanajualo], Acambaro, 30.iii.1889 (*Rhoads*) / Argia tarascana Calv., ♂ TYPE, P. P. Calvert det. 1902, B.C.A. Neur. p. 91. Original of pl. iv, f. 51ss.

tasmanica Tillyard (race of ***Ischnura heterosticta***), 1913 : 451. LECTOTYPE ♂. Tas-[mania], Cressy, 3.i.[19]09 (*R. J. Tillyard*) / Ischnura heterosticta tasmanica Till., ♂ Lectotype, D. E. Kimmins det., 1969.

The BMNH has three ♂ examples of the type-series, from which the above example has been selected. They were over the label *tasmanica* in his collection, but bore no determination labels.

tinctipennis McLachlan (***Erythromma***), 1894 : 436 (♀); 1896 : 373–4 (♂). LECTOTYPE ♀. Type [McL. label] / Ta-chien-lu / Erythromma tinctipennis McL. / Pyrrhosoma tinctipenne McL. / Erythromma tinctipennis McL., ♀ Lectotype, D. E. Kimmins det. 1969.

Of the three syntype females, two are now in BMNH and one has been chosen above as Lectotype. The BMNH also has the ♂ allotype.

torresiana Tillyard (***Ischnura***), 1913 : 452–453, pl. 48, figs 5–6. LECTOTYPE ♂. N[orth] Q[ueensland], Cooktown, i.[19]08 (*R. J. Tillyard*) / Ischnura torresiana Till., ♂ TYPE, R. J. T. / Ischnura torresiana Till., ♂ Lectotype, D. E. Kimmins det. 1969.

triangularis Laidlaw (***Pericnemis***), 1913*a* : 248. Holotype ♀. Borneo, Bettotan, 13.vii. [19]27 (*C. Boden Kloss*) / Pericnemis triangularis n. sp. ♀ type [Laidlaw's writing].

The holotype now lacks abdominal segments 8–10.

trifoliata Fraser (***Argia***), 1946. Kimmins, 1966 : 216.

truncatipenne Calvert (***Anisagrion***), 1902 : 106, pl. v, fig. 17. Holotype ♂ (incomplete). Guatemala, El Reposo [Pacific coast-region] (*Champion*) / Anisagrion truncatipenne Calv. TYPE, P. P. Calvert det. 1902. B.C.A. Neur., p. 106, Original of pl. v, fig. 17.

ulmeca Calvert (***Argia***), 1901 : 80, pl. iv, figs 9, 34, 34s, 34i. Holotype ♂. Vera Cruz, Atoyac, v (*H. H. S[mith]*) / Argia ulmeca Calv. COTYPE ♂. P. P. Calvert det. 1901. Original of ff. 34, 34s, pl. iv, B.C.A. Neur.

umbriaca Fraser (***Argia***) 1946. Kimmins, 1966 : 217.

underwoodi Calvert (***Argia***), 1907 : 370, pl. 8, figs 36, 37, 37s. Holotype ♂. Costa Rica, Carillo (*Underwood*) / Costa Rica, Carillo (*C. F. Underwood*) / Argia underwoodi Calv. ♂ TYPE, P. P. Calvert, det. 1907, B.C.A. Neur. p. 370. Original of pl. viii, ff. 37, 37s.

vagabundum Perkins (***Agrion***), 1899 : 75. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Kauai, Lihue (*Perkins*) / Agrion vagabundum Prk. / Agrion vagabundum Prk., Type / Agrion vagabundum Prk., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in *Megalagrion*.

vansomereni Pinhey (***Enallagma***), 1956 : 26–27, text-fig. 4. Holotype ♂. Uganda, Acholi, Paimal, iv.1952 (*T. H. E. Jackson*) / Enallagma vansomereni Pinhey, 1954. HOLOTYPE.

vansomereni Pinhey (***Pseudagrion***), 1961 : pl. 2, figs 2, 9. Holotype ♂. Uganda, Aswa R[iver], Karamoja, iii.[19]52 (*T. H. E. Jackson*) / Pseudagrion vansomereni Pinh. [♂] Holotype.

varralli Fraser (***Mortonagrion***), 1920. Kimmins, 1966 : 217.

versicolor Fraser (***Telebasis***), 1946. Kimmins, 1966 : 217.

victoria Fraser (***Agriocnemis***), 1928. Kimmins, 1966 : 217.

violacea Fraser (**Coenagrion**), 1924. Kimmins, 1966 : 218.

waianeanum Perkins (var. of **Agrion amaurodytum**), 1899 : 67. LECTOTYPE ♂. Hawaiian Islands (*R. C. L. Perkins*) / Oahu, Waianae Mts, 2000 ft, iv.1892 (*Perkins*) / Agrion amaurodytum var. waianeanum Prk., Type / A. amaurodytum Prk., race waianaeanum / Agrion amaurodytum var. waianeanum Prk., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed as *Megalagrion*.

wallacei Campion (**Teinobasis**), 1924 : 613–614, fig. 1. ♂ Holotype. N[ew] Guin[ea] (*Wallace*) / N / Teinobasis wallacei Campion, ♂ Holotype, det. D. E. Kimmins, 18.ix.1933.

whellani Longfield (**Ceriagrion**), 1952 : 42–43, fig. 2. Holotype ♂. S. Rhodesia, Dept. Agric., Melsetter Distr., Chibudzana R., 16.xi.1948 / *J. A. Whellan*, collector / Ceriagrion whellani sp. n. Type ♂, det. Miss C. Longfield / figured.

whellani Pinhey (**Pseudagrion**), 1956 : 18–22, text-figs 1, 2. Holotype ♂. Uganda, Acholi, Madi Opei, iii.1952 (*T. H. E. Jackson*) / Male and Female in copula / Pseudagrion whellani Pinh., 1954, HOLOTYPE.

williamsoni Fraser (**Pseudagrion**), 1922. Kimmins, 1966 : 219.

zelandica McLachlan (**Telebasis**), 1873 : 35–36. LECTOTYPE ♂. Type [McL. label] / New Zealand / Xanthagrion Zelandicum Selys ♂ / Telebasis zelandica McL. / Telebasis zelandica McL., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Xanthocnemis*.

PSEUDOSTIGMATIDAE

abnorme McLachlan (**Anomisma**), 1877 : 87. Holotype ♂. Type [McL. label] / E. Peru? / Rio Napo / Anomisma abnorme, McL.

buckleyi McLachlan (**Mecistogaster**), 1881 : 32. LECTOTYPE ♂. Type [McL. label] / Ecuador, R. Bobonaza (*Buckley*) / Mecistogaster buckleyi McL., / Mecistogaster buckleyi McL., ♂ Lectotype, D. E. Kimmins det. 1968.

calcipennis Fraser (**Microstigma**), 1946. Kimmins, 1966 : 185.

sincerus McLachlan (race of **Mecistogaster jocaste** Hagen), 1877 : 88; 1881 : 32. LECTOTYPE ♀. Type [McL. label] / Pebas, Amazons (*Hauxwell*) / 13 / Mecistogaster sincerus McLachl. ♀ / Mecistogaster sincerus McL. ♀ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a var. of *M. jocaste* Hagen.

terminatum McLachlan (**Microstigma**), 1877 : 87. Holotype ♀. Type [McL. label] / E. Peru? / Rio Napo / Microstigma terminatum McL. / Anomisma abnorme McL. ♀.

Synonymized with *Anomisma abnorme* McL., by McLachlan, 1881 : 31 as 'first reviser'.

PERILESTIDAE

bispinus Kimmins (**Perilestes**), 1958 : 353–354, fig. 3. Holotype ♂. [Brazil, Rio Negro], Thomar / Perilestes bispinus Kim., ♂ Type, D. E. Kimmins det., 1958.

risi Morton (**Chorismagrion**), 1914 : 170–172, pl. 9, figs 1–3. Holotype ♂. Cape York, N. Queensland / Nov. gen., nov. spec., det. Dr F. Ris / Chorismagrion risi Mort. TYPE [in Fraser's writing] / One pair of wings in Ris collection, *teste* F. C. Fraser [D.E.K.].

This example was presented to BMNH in 1953 by F. C. Fraser, with other type material.

SYNLESTIDAE

albicauda Tillyard (**Synlestes**), 1913*a* : 238–241, pl. 15, figs 10–11. LECTOTYPE ♂. Q[ueensland], [Mount] Tambourine, 2.i.[19]13, in cop. (*R. J. Tillyard*) / Synlestes albicauda Till., TYPE ♂, R.J.T. / Synlestes albicauda Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Tillyard (: 240) specified a pair in cop. as 'Types ♂, ♀', but did not indicate which was the holotype; therefore the above lectotype designation has been made. Currently placed in the genus *Episynlestes*.

nigrescens Tillyard (ssp. of **Synlestes weyersi**), 1917 : 472–473, fig. 8b. LECTOTYPE ♂. N[ew] S[outh] W[ales], Illawarra, 11.ii.[19]11 (*R. J. Tillyard*) / Synlestes weyersi nigrescens Till., TYPE ♂, R.J.T. / Synlestes weyersi nigrescens Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Fraser (1960 : 26) treats this taxon as a species.

selysi Tillyard (**Synlestes**), 1917 : 473–475, pl. 13, text-figs 7–8. LECTOTYPE ♂. N[ew] S[outh] W[ales], Hornsby, 31.iii.[19]17 (*R. J. Tillyard*) / Synlestes selysi Till., TYPE ♂, R.J.T. / Synlestes selysi Till., ♂ Lectotype, D. E. Kimmins det. 1968.

tropicus Tillyard (**Synlestes**), 1917 : 475, text-figs 8d, 9. Holotype ♂. N. Q[ueensland], Kuranda, 20.xii.[19]12 (*F. P. Dodd*) / Synlestes tropica [*sic*] Till., TYPE ♂. R.J.T.

LESTIDAE

albicauda (Selys MS) McLachlan (**Lestes**), 1896 : 23–24. LECTOTYPE ♂. 'N'[New Guinea] / Lestes albicauda Selys n. sp. ♂ / Lestes albicauda McL. / Lestes albicauda McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Lieftinck, 1951 : 6 designated a 'holotype', but as a holotype can only be designated in the original publication, I have here designated the same example as Lectotype. Currently placed in *Lestes* (*Indolestes*).

alleni Tillyard (**Austrolestes**), 1913 : 425, pl. 45, figs 11–12. LECTOTYPE ♂. N. Q[ueensland], Cairns, ix.[19]05 (*E. Allen*) / Lestes Alleni Till., ♂ TYPE, R.J.T., with in pencil 'albicauda McL.' / Lestes alleni Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the subgenus *Indolestes*. The pencil annotation on Tillyard's label may be an error for *Austrolestes albicauda* Ris, *nec* McL., which has been placed as a synonym of *A. alleni* Tillyard.

aridus Tillyard (**Lestes**), 1908*a* : 762–764, pl. 42, figs 4–5. LECTOTYPE ♂. [Australia], N[orth] T[erritory], Tennant's Creek, i.[19]06 (*J. Field*) / Lestes aridus Till., ♂ TYPE, R.J.T. / Lestes aridus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as *Lestes* (*Austrolestes*).

aruanus Lieftinck (**Lestes**), 1951 : 8–9, fig. 4. Holotype ♂. Aru / Type [McL. label] / Lestes albicauda ♂, Selys, sp. n., Aru [in Selys' writing] / Lestes albicauda McL. [with paratype label attached] / Lestes aruanus Lieftinck, Holotype, det. M. A. Lieftinck, 1947.

The holotype lacks its head. Currently placed in the subgenus *Indolestes*.

californica (Selys MS) McLachlan (**Archilestes**), 1895 : 20–21. Holotype ♂. Type [McL. label] / California ([*Henry*] *Edwards*) / Archilestes californicus Selys ♂ n. sp. [Selys' writing] / Archilestes californica McL.

The locality and collector's labels, being very small, have been assembled as one label.

cheesmanae Kimmins (**Austrolestes**), 1936 : 69–70, text-figs 1–4. Holotype ♂. New Hebrides, Erromanga, vii.1930 (*L. E. Cheesman*) / Austrolestes cheesmanae sp. n. ♂.

Currently placed as *Lestes* (*Austrolestes*).

colensonis White (**Agrion**), 1846 : pl. 6, fig. 3; Selys, 1862 : 328–329; White, 1874 : 25. LECTOTYPE ♂. New Zealand, on reverse a BM register number [18]45–61 / Agrion colensonis White, ♂ Lectotype, D. E. Kimmins det. 1968.

The first reference is to a figure, published with a name in 1846; Selys gave a description (1862) under the name *Lestes colensonis* Adam White and in 1874 White gave references to the original publication and that of Selys and stated that the type was in the BMNH. Currently placed in the genus *Austrolestes*.

davenporti Fraser (**Ceylonolestes**), 1930. Kimmins, 1966 : 188.

decipiens Kirby (**Lestes**), 1894 : 565–566. LECTOTYPE ♂. Mahagany, 20.ix.[18]91 / Ceylon, Yerbury Coll. / decipiens type [WFK] / Lestes decipiens Kirby, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a subspecies of *Paralestes praemorsa* (Selys).

disarmatus Fraser (***Lestes***), 1961. Kimmins, 1966 : 189.

dorothea Fraser (***Lestes***), 1924. Kimmins, 1966 : 190.

excelsa Fraser (***Orolestes***), 1933. Kimmins, 1966 : 191.

At the time when this type deposited in the BMNH (1953), Fraser informed me that one pair of wings had been presented to the Ann Arbor Museum, Michigan. During the preparation of this paper however, this pair of wings was discovered in his collection, and they have now been re-attached to the type.

helena Fraser (***Indolestes***), 1922. Kimmins, 1966 : 195.

indica Fraser (***Indolestes***), 1922. Kimmins, 1966 : 197.

insularis Tillyard (***Austrolestes***), 1913 : 425–426, pl. 45, figs 13–14. Holotype ♂. [Queensland, Torres Straits], Banks Is., 16.ii.[19]10 (*H. Elgner*) / Austrolestes insularis Till., R.J.T., ♂ TYPE.

Currently placed as *Lestes* (*Indolestes*).

nigriceps Fraser (***Lestes***), 1924. Kimmins, 1966 : 206.

obscurus Kirby (***Lestes***), 1898 : 245. Holotype ♂. [Transvaal], Barberton / obscurus patype [*sic*] Kirby [in Distant's writing] / Lestes obscurus Kirby, ♂ Holotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Lestes plagiatus* Burm.

paludosus Tillyard (***Lestes***), 1906 : 181–182, pl. 17, figs 3a, 3b. LECTOTYPE ♂. N. Q[ueensland], Townsville, i.[19]05 (*R. J. Tillyard*) / Lestes paludosus Till., ♂ TYPE, R.J.T. / Lestes paludosus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed as a synonym of *Lestes concinnus* Hag.

psyche Selys (***Lestes***), 1962 : 329.

In the BMNH there is a damaged ♀ syntype (*ex* McLachlan collection), labelled Type by him, which is possibly the ♀ referred to in the original description.

pulcherrima Fraser (***Ceylonicolestes***), 1924. Kimmins, 1966 : 210.

quercifolia Selys (***Lestes***), 1878 : 318; 1891 : 64. LECTOTYPE ♀. Type [McL. label] / Menado / Lestes quercifolia Selys ♀ (race de Praemorsa) / Lestes quercifolia Selys, ♀ Lectotype, D. E. Kimmins det. 1968.

Whether the Menado form of *praemorsa* is worthy of a name, I will leave for others to decide; the name does not appear to have come into general use. *L. praemorsa* Hagen is currently placed in *Paralestes*.

selysi McLachlan (***Orolestes***), 1895 : 22–23. LECTOTYPE ♂. Type [McL. label] / Darjeeling / Orolestes Selysi McL. / Orolestes selysi McL., ♂ Lectotype, D. E. Kimmins det. 1968.

The lectotype now lacks the right hind wing. Fraser (1929 : 838–839, fig. 2) refers to the two examples in the McLachlan coll., and states that it has not been re-discovered at Darjeeling. He also gives a photograph purporting to be of the wings of this species, which does not appear to have been taken from either of the two McLachlan examples. In 1923 : 25–27, Fraser repeats his statement but gives wing figures from a different example, collected by Dr A. Kerr in Laos, 1932.

sikkima Fraser (***Lestes***), 1929. Kimmins, 1966 : 213.

simulatrix McLachlan (***Lestes***), 1895 : 25–27. Holotype ♂. Type [McL. label] / Madagascar / Lestes simulatrix McL.

Currently placed in the genus *Paralestes*.

tenuissimus Tillyard (***Austrolestes***), 1906 : 179–181, pl. 17, figs 2a, 2b. LECTOTYPE ♂. N. Q[ueensland], Cairns, i.[19]05 (*R. J. Tillyard*) / Lestes tenuissimus Till., ♂ TYPE, R.J.T. / Lestes tenuissimus Till., D. E. Kimmins det. 1968.

Currently placed in *Lestes* (*Indolestes*).

tridens McLachlan (***Lestes***), 1895 : 24–25. Holotype ♂. Type [McL. label] / Delagoa Bay / Lestes tridens McL.

Currently placed in the genus *Paralestes*.

veronica Fraser (***Indolestes***), 1924. Kimmins, 1966 : 217.

unicolor McLachlan (***Lestes***), 1895 : 27–28. LECTOTYPE ♂. Type [McL. label] / Tamatave, Madagascar / Lestes unicolor McL. / Lestes unicolor McL., ♂ Lectotype, D. E. Kimmins det. 1968.

The lectotype has part of the left fore wing attached to a card.

wallacei Kirby (***Lestes***), 1889 : 302–303. Holotype ♀. Sar[awak], Jo. / (*Wallace*) / Wallacei type [WFK's writing] / Lestes wallacei Kirby, ♀ Holotype. D. E. Kimmins det. 1968.

Now placed in the genus *Orolestes*.

MEGAPODAGRIIDAE

aequatoriale Selys (***Heteragrion***), 1886 : 63–64. LECTOTYPE ♂. Type [McL. label] / Bogota / Heteragrion aequatoriale Selys ♂, Bogota / Heteragrion aequatoriale Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

McLachlan's marked type-series includes two from New Granada, which are not included in the original description, although they bear determination labels in Selys' writing.

albescens Tillyard (ssp. ***Argiolestes griseus***), 1913 : 414–415. LECTOTYPE ♂. [South] Queensland, Stradbroke Id., 2.x.[19]11 (*H. Hacker*) / Argiolestes griseus albescens ♂ TYPE, R.J.T. / Argiolestes griseus albescens Till., ♂ Lectotype, D. E. Kimmins det. 1968.

alpinus Tillyard (***Argiolestes***), 1913 : 417–419, pl. 44, figs 7, 8. LECTOTYPE ♂. N[ew] S[outh] W[ales], Ebor, [4600–4800 ft], 3.i.[19]12 (*R. J. Tillyard*) / Argiolestes alpinus ♂ TYPE. R.J.T. / Argiolestes alpinus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

angustipennis Selys (race of ***Heteragrion aequatoriale***), 1886 : 64–65. LECTOTYPE ♂. Ecuador / Heteragrion angustipennis Selys, ♂ Ecuador / Heteragrion angustipennis Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Selys described the ♂ as lacking the three last segments of the abdomen, but since then these segments have been glued on, possibly by McLachlan.

aureus Tillyard (***Argiolestes***), 1906 : 178–179, pl. 17, figs 1a, 1b. LECTOTYPE ♂. N. Q[ueensland], Kuranda, xii.[19]04 (*R. J. Tillyard*) / Argiolestes aurea [*sic*] Till., ♂ TYPE, R.J.T. / Argiolestes aureus Till., ♂ Lectotype, D. E. Kimmins det., 1968.

carrillica Calvert (***Philogenia***), 1907 : 356–357, pl. 7, figs 6, 7, 12. Holotype ♂. Costa Rica, Carrillo (*Underwood*) / Philogenia carrillica Calv., P. P. Calvert det. 1907. B.C.A. Neur., p. 356. TYPE. Original of Pl. VII, figs 6, 7, 12.

championi Calvert (***Philogenia***), 1901 : 61, pl. 5, figs 3, 4. Holotype ♂. [Panama], V[olcan] de Chiriqui, below 4000 ft, ([*G. C.*] *Champion*) / Gizzard removed / Original of figs 3, 4, 4a, Pl. V, B.C.A. Neur., Philogenia championi Calv., ♂ TYPE, P. P. Calvert det. 1901.

chrysoides Tillyard (***Argiolestes***), 1913*a* : 237–238, pl. 15, figs 8, 9. Holotype ♂. Q[ueensland, Blackall Ranges], Montville, 6.x.[19]12 ([*A.*] *J. Turner*) / Argiolestes chrysoides TYPE ♂, R.J.T.

The locality label incorrectly gives the collector's name as E. J. Turner.

coartans Lieftinck (***Argiolestes***), 1956 : 81–84, figs 10, 14, 15. Holotype ♂. N. Dutch New Guinea, Waigeu [Island], Camp Nok, 2500 ft, iv.1938 (*L. E. Cheesman*) / Argiolestes coartans Lieftinck, Holotype, det. M. A. Lieftinck, 1955.

curtum Selys (***Megapodagrion***), 1886 : 46, 47. Holotype ♂. Type [McL. label] / Ecuador, R. Bobonaza (*Buckley*) / Megapodagrion curtum Selys, ♂.

The original description has the generic and specific names misspelt 'Megapodagriom curtue'.

duodecima Calvert (***Paraphlebia***), 1901 : 60, 61, pl. 5, fig. 2. Holotype ♂. [Guatemala], Vera Paz, Purula ([*G. C.*] *Champion*) / Paraphlebia duodecima Calv., P. P. Calvert det. 1901. TYPE. Original of Pl. V, fig. 2, B.C.A. Neur.

eboracus Tillyard (ssp. ***Argiolestes griseus***), 1913 : 413. LECTOTYPE ♂. N[ew] S[outh] W[ales], Ebor, 18.xii.[19]11 (*R. J. Tillyard*) / Argiolestes griseus eboracus Till., ♂ TYPE, R.J.T. / Argiolestes griseus eboracus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

ephippiatus Lieftinck (***Argiolestes***), 1956 : 97–98, figs 35, 36. Holotype ♂. [N.] Papua, Kokoda, 1200 ft, ix.1933 (*L. E. Cheesman*) / Argiolestes ephippiatus Lieft., HOLOTYPE, det. M. A. Lieftinck, 1955.

erythrogastrum Selys (***Heteragrion***), 1886 : 61–62. LECTOTYPE ♂. Type [McL. label] / Chiriqui / Heteragrion erythrogastrum Selys, ♂ Chiriqui [Selys' writing] / Heteragrion erythrogastrum Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

I do not regard Calvert's statement (1901 : 65) concerning the incomplete example from McLachlan's collection (labelled 'Type') and studied by Calvert, as a designation of lectotype, since McLachlan so labelled all the type-series in his collection. I do not know of any later type-designation and have therefore designated the above complete example as Lectotype.

flaviceps Fraser (***Burmargiolestes***), 1933. Kimmins, 1966 : 191.

fontanus Tillyard (***Argiolestes***), 1913 : 417–419, pl. 44, figs 9–10. LECTOTYPE ♂. N[ew] S[outh] W[ales], Dorrigo, 11.xii[19]11 (*R. J. Tillyard*) / Argiolestes fontanus ♂ TYPE, R.J.T. / Argiolestes fontanus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

intermedius Tillyard (race of ***Argiolestes griseus***), 1913 : 412–413. LECTOTYPE ♂. Vic[toria], Alexandra, xii.[19]06 (*R. J. Tillyard*) / Argiolestes griseus intermedius Till., ♂ TYPE, R.J.T. / Argiolestes griseus intermedius Till., ♂ Lectotype, D. E. Kimmins det. 1968.

leucorrhinum Selys (***Heteropodagrion Mesagrion***), 1885 : cxliv; 1886 : 50–51. Holotype ♂, Type [McL. label] / Bogota / Mesagrion leucorrhinum ♂ Selys, Bogota, with on underside, Heteropodagrion [deleted] leucorrhinum ♂ Selys, Bogota.

maclachlani Selys (***Allolestes***), 1869 : 97–98. Holotype ♀. Type [McL. label] / Seychelles (*Wright*) / Allolestes maclachlani ♀ Selys.

Legs glued to card, first six segments of abdomen only present, abdomen glued on upside down.

malgassica Kirby (***Tatocnemis***), 1889 : 302, 2 text-figs. Holotype ♂. Mad[agascar, Betsileo (*Deans Cowan*)] / Tatocnemis malgassica type [WFK's writing].

An additional locality label, giving full details, has been added.

microstigma Lieftinck (***Argiolestes***), 1956 : 99–101, figs 40, 41. Holotype ♂. [C.] Papua, Mafulu, 4000 ft, i.1934 (*L. E. Cheesman*) / Argiolestes microstigma Lieft., HOLOTYPE, Det. M. A. Lieftinck, 1955.

minimus Tillyard (***Argiolestes***), 1908 : 735–737, pl. 35, figs 11, 12. LECTOTYPE ♂, W. A[ustralia], Bridgetown, i.[19]07 (*R. J. Tillyard*) / Argiolestes minima [*sic*] Till., ♂ TYPE, R.J.T. / Argiolestes minimus Till., ♂ Lectotype, D. E. Kimmins det. 1968.

nigra Kimmins (***Bornargiolestes***), 1936 : 87–88, figs 9, A–D. Holotype ♂. Sarawak, Mt Dulit, 3000 ft, 24.x.1932 (Native collector) / Bornargiolestes nigra ♂ Type, Kimmins, det. D. E. Kimmins.

nobilis Tillyard (ssp. ***Argiolestes icteromelas***), 1913 : 410. LECTOTYPE ♂. N[ew] S[outh] W[ales], Ebor, [4000–5000 ft], 6.i.[19]12 (*R. J. Tillyard*) / Argiolestes icteromelas nobilis Till., ♂ TYPE, R.T.J. / Argiolestes icteromelas nobilis Till., ♂ Lectotype, D. E. Kimmins det. 1968.

pallidistigma Fraser (***Calilestes***), 1926. Kimmins, 1966 : 208.

prothoracalis Lieftinck (***Argiolestes***), 1956 : 98–99, figs 33, 34. Holotype ♂. [N.] Papua, Kokoda, 1200 ft, vi.1933 (*L. E. Cheesman*) / Argiolestes prothoracalis Lieft. HOLOTYPE, Det. M. A. Lieftinck, 1955.

quinta Calvert (***Paraphlebia***), 1901 : 60, pl. 5, fig. 1. Holotype ♂. Guatemala, [Vera Paz], Panima ([*G. C.*] *Champion*) / Paraphlebia quinta Calvert, P. P. Calvert det. 1901. TYPE. Original of pl. v, fig. 1, B.C.A. Neur.

raphaella Selys (***Philogenia***), 1886 : 37. Holotype ♂. Type [McL. label] / Bogota / Philogenia raphaella Selys.

roseonotata Selys (***Podopteryx***), 1871 : 415–416. Holotype ♂. Aru Isl[and, (*Wallace*)] / Podopteryx roseonatatus de Selys (unique).

setigerum Selys (***Megapodagrion***), 1886 : 42–43. Holotype ♂. Type (McL. label] / Ecuador, Intaj / Megapodagrion setigerum ♂ Selys.

The type now lacks its head.

tenuis Tillyard (ssp. ***Argiolestes griseus***), 1913 : 413–414. Holotype ♂. N[ew] S[outh] W[ales], [Hornsby], N[ear] Sydney, 18.xii.[19]09 (*R. J. Tillyard*) / Argiolestes griseus tenuis Till., ♂ TYPE, R.J.T.

tricellulare Calvert (***Heteragrion***), 1901 : 63, pl. 5, fig. 5. Holotype ♂. [Guatemala], S[an] Gerónimo, 3000 ft, ([*G. C.*] *Champion*) / D taken with C / Heteragrion tricellulare Calv. P. P. Calvert det. 1901. B.C.A. Neur., p. 63. TYPE. Original of pl. 5, fig. 3.

Example C (taken with above) is not in our collection.

trinervis Selys (***Neurolestes***), 1885 : cxliv; 1886 : 71–72. LECTOTYPE ♂. Type [McL. label] / Old Calabar, *R*[*utherford*] 73 / Nevrolestes trinervis Selys ♂, Old Calabar / Neurolestes trinervis Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Selys (1886 : 72) gives the locality as 'Old Thal', probably a printer's error for 'Old Calabar'.

PSEUDOLESTIDAE

inopinata McLachlan (***Thaumatoneura***), 1897 : 131. Holotype ♂ (incomplete). [No locality data] / Thaumatoneura inopinata McL. (Type).

The specimen was purchased by McLachlan, without locality data and with abdominal segments 5–10 lacking.

mirabilis Kirby (***Pseudolestes***), 1900 : 538–539, pl. 12, fig. 3. LECTOTYPE ♂. Hainan, 5-fingered Mt. [*J. Whitehead*] / Pseudolestes mirabilis ♂ Kirb[y] (type) / Pseudolestes mirabilis ♂ Kirby ♂ Lectotype, D. E. Kimmins det. 1968.

The lectotype lacks segments 7–10 of abdomen. The name J. T. Thomasson on the label is that of the donor; the material was collected by J. Whitehead. There is a seventh example, by the same collector, in the BMNH from the Crowley Bequest. This is complete, but cannot be included in the type-series. In view of this additional example, I have labelled the paralectotypes.

pellucida Calvert (***Thaumatoneura***), 1094 : 216; 1908 : 355. LECTOTYPE ♂. Costa Rica, Carrillo (*Underwood*) / Thaumatoneura pellucida Calv., P. P. Calvert det. 1907, B.C.A. Neur., p. 355. COTYPE / Thaumatoneura pellucida Calv., ♂ Lectotype, D. E. Kimmins det. 1968.

In describing this species, Calvert states 'Mr F. D. Godman has recently acquired for the *Biologia Centrali-Americana* six males of this genus, taken at Carrillo, Costa Rica, by Mr F. C. Underwood. Four are *T. inopinata* McLachlan, two are new.' The specimen in our collection is part of the BCA collection, which was acquired by the BMNH in 1911. It was labelled COTYPE by Calvert, but one would assume that Godman would have had the type in the BCA collection. I do not know of any earlier selection of type for this species and I have therefore designated the BMNH example as Lectotype.

LESTOIDEIDAE

conjuncta Tillyard (***Lestoidea***), 1913 : 428–429, pl. 46, figs 1–2, pl. 47, fig. 1. Holotype ♂. [N. Queensland], Kuranda, i.[19]08 (*E. Allen*) / Lestoidea conjuncta Till., ♂ TYPE, R.J.T.

POLYTHORIDAE

adjuncta Fraser (ssp. ***Polythore derivata***), 1946. Kimmins, 1966 : 177.

aequatorialis Selys (race of ***Thore picta***), 1873 : 500. Holotype ♀. Type [McL. label) / Ecuador / Thore aequatorialis ♀ de Selys, race de picta?

Currently placed in the genus *Polythore*. The type lacks most of the abdomen.

alcyone Selys (***Cora***), 1873 : 503. Lectotype ♂ (Montgomery, 1967 : 142). Type [McL. label] / Bogota / Cora alcyone Selys ♂ [Selys' writing] / Lectotype, Montgomery, 1967, D. E. Kimmins.

The penis has been removed for study.

ambigua Fraser (ssp. ***Polythore derivata***), 1946. Kimmins, 1966 : 177.

beata McLachlan (***Thore***), 1869 : 28. Lectotype ♂ (Montgomery, 1967 : 151). Type [McL. label] / Up[per] Amaz[ons], Pebas (*Hauxwell*) / Thore beata McL. / Lectotype, Montgomery, 1967, D. E. Kimmins.

Currently placed in the genus *Polythore*. Montgomery lists Type ♂ and paratypes in BM(NH), and in effect selected the example bearing a type label as the lectotype.

boliviana McLachlan (***Thore***), 1878 : 89. Holotype ♂. Type [McL. label] / Bolivia, Chairo / Thore boliviana McL. [McL. label] / boliviana McLach. ♂ [Selys' label].

Currently placed in the genus *Polythore*.

chirripa Calvert (***Cora***), 1907 : 348. Lectotype ♂ (Montgomery, 1967 : 143). Costa Rica, Carillo (*Underwood*) / Cora chirripa Calvert ♂ Cotype. P. P. Calvert, det. 1907, B.C.A. Neur., p. 348 / Lectotype, Montgomery, 1967, D. E. Kimmins.

concinna McLachlan (***Thore***), 1881 : 28. LECTOTYPE ♂. Type [McL. label] / Ecuador, R. Bobonaza (*Buckley*) / Thore concinna McL. / Thore concinna McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Polythore*.

cyane Selys (***Cora***), 1853 : 71, 72. Lectotype ♂ (Montgomery, 1967 : 144), Venezuela / Cora cyane de Selys ♂ [Selys' writing] / Cora cyane Selys, Lectotype, Montgomery, 1967.

derivata McLachlan (***Thore***), 1881 : 27. LECTOTYPE ♂. Type [McL. label] / Ecuador, R. Bobonaza (*Buckley*) / Thore derivata McL. / Thore derivata McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Polythore*.

dualis McLachlan (***Cora***), 1878 : 90. LECTOTYPE ♂. Type [McL. label] / Ecuador, Intaj / Cora dualis McL. [McL. writing] / Cora dualis McL., ♂ Lectotype, D. E. Kimmins det. 1968.

The type-series was restricted by Montgomery (1967 : 144) to 'the types and paratype ♂ in the Br. Mus.' The penis of the lectotype has been removed for study.

jocosa McLachlan (***Cora***), 1881 : 30. Holotype ♂. Type [McL. label] / Ecuador, Rio Bobonaza (*Buckley*) / Cora jocosa McL.

Currently placed in the genus *Josocora*. The penis of the type has been removed for study.

mirabilis McLachlan (***Euthore***), 1878 : 87. LECTOTYPE ♂. Type [McL. label] / Ecuador, Intaj, / Euthore mirabilis McL. / Euthore mirabilis McLachlan, ♂ Lectotype, D. E. Kimmins det. 1968.

Montgomery (1967 : 148) restricted the choice of lectotype to the series in the BM(NH).

munda McLachlan (***Cora***), 1878 : 91. Lectotype ♂ (Montgomery, 1967 : 146). Type [McL. label] / Ecuador, Intaj [*C. Buckley*] / Cora munda McL. / Lectotype ♂, Montgomery, 1967, D. E. Kimmins.

I consider that Montgomery, by his statement 'Type: ♂. Intaj, Ecuador . . . . In Br. Mus., ex coll. McLachlan' in effect designated the BM(NH) example (which then carried a holotype label) as the Lectotype.

mutata McLachlan **(*Thore*)**, 1881 : 29. LECTOTYPE ♂. Type [McL.] / Ecuador, R. Bobonaza (*Buckley*) / Thore mutata McL. / Thore mutata McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Polythore*.

originata Fraser (ssp. ***Polythore derivata***), 1946. Kimmins, 1966 : 208.

plagiata Selys **(*Euthore*)**, 1873 : 501. Holotype ♀. Type [McL. label] / Rio Negro / 206 / Euthore plagiata Selys ♀.

pulchella Kirby **(*Sapho*)**, 1889 : 300. LECTOTYPE ♂. Colombia [WFK] / S[apho] pulchella type [WFK] / Sapho pulchella Kirby, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in *Polythore*. The locality of this species was originally given as 'Cameroons' but the label was later changed to 'Colombia' by Kirby. The collection from which it was described included material from both countries and when Kirby realized that he had mistakenly placed the species in an African genus, he must have changed the locality label.

saundersi Selys **(*Thore*)**, 1853 : 70. LECTOTYPE ♂. Amaz[ons] / 54 / Thore saundersii Selys / Thore saundersi Selys, ♂ Lectotype, D. E. Kimmins det. 1968.

Currently placed in the genus *Polythore*, as a synonym of *Polythore picta* (Rambur).

scintillans McLachlan **(*Chalcopteryx*)**, 1870 : 169–170. LECTOTYPE ♂. St. Paulo / Chalcopteryx scintillans McL., ♂ Lectotype, D. E. Kimmins det. 1968.

Montgomery (1967 : 142) makes two slight errors. McLachlan states that he examined 6, not 9, examples, of which 5 are now in the BM(NH). The register number of the specimens is 65/3, not 115/3, a mis-reading of the badly written figure 6.

skinneri Calvert **(*Cora*)**, 1907 : 349. Holotype ♂. Costa Rica, Tablazo, 1300–1600 m, vi.[19]05 (*Biolley*) / Cora skinneri Calv. ♂ TYPE, P. P. Calvert det. 1907. B.C.A. Neur. p. 349.

The penis of the type has been removed for study.

terminalis McLachlan **(*Cora*)**, 1878 : 92. LECTOTYPE ♂. Type [McL. label] / Bolivia, Unduavi / Cora terminalis McL. [McL. label] / Cora terminalis McL. [Selys' label] / Cora terminalis McL., ♂ Lectotype, D. E. Kimmins det. 1968.

The penis of the lectotype has been removed for study. The allotype ♀ lacks most of its abdomen.

terminata Fraser (ssp. ***Polythore derivata***), 1946. Kimmins, 1966 : 216.

victoria McLachlan **(*Thore*)**, 1869 : 28. Holotype ♂. Type [McL. label] / Bolivia / Thore victoria ♂ McLachl. [Selys' label].

Currently placed in the genus *Polythore*.

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Printed in England by Staples Printers Limited at their Kettering, Northants, establishment

STUDIES OF AFRICAN ASILIDAE (DIPTERA) I. ASILIDAE OF THE CONGO BASIN

BRITISH MUSEUM
21 MAY 1970
NATURAL HISTORY

H. OLDROYD

BULLETIN OF
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ENTOMOLOGY Vol. 24 No. 7
LONDON: 1970

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I. ASILIDAE OF THE CONGO BASIN

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21 MAY 1970
NATURAL HISTORY

BY

HAROLD OLDROYD

Pp. 207–334 ; 96 *Text-figures*

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THE BRITISH MUSEUM (NATURAL HISTORY)
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LONDON : 1970

THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in* 1949, *is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

In 1965 *a separate supplementary series of longer papers was instituted, numbered serially for each Department.*

This paper is Vol. 24 *No.* 7 *of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.*

World List abbreviation
Bull. Br. Mus. nat. Hist. (Ent.)

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 27 *May,* 1970

Price £3 15s.
(£3·75)

STUDIES OF AFRICAN ASILIDAE (DIPTERA)

I. ASILIDAE OF THE CONGO BASIN

By H. OLDROYD

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SYNOPSIS

A preliminary survey is made of the genera and species of Asilidae known to occur within the geographical area of the Congo Basin. Keys are given to tribes and genera : wherever possible, keys are given to all the African species of the genus (S. of the Sahara), but in some genera at this stage it is possible only to give keys to the species known to occur in the Congo Basin. A few big genera—notably *Ommatius* and *Neolaparus*—are so poorly known that keys are useless until a generic revision has been undertaken. Three new genera and 39 new species are described.

INTRODUCTION

THE present paper originated in an invitation to examine and report upon the Asilidae taken in the Garamba National Park, in the extreme north-east corner of the Congo Basin. At the time I had on loan a good deal of material from the Musée Royal de l'Afrique Central, in Tervuren, and from the Institut Royal des Sciences Naturelles de Belgique, and collections from Urundi and from Kasai made by my friend Monsieur Frans François. All the authorities concerned kindly agreed that I should write a combined report on their material, which should be published in the series of volumes of the Exploration du Parc National de la Garamba : Mission H. De Saeger.

Unfortunately changed circumstances made it impossible for the paper to appear in this form, and the Editors of the Bulletin of the British Museum (Natural History) generously agreed to accept it for publication in their series. The collections of the British Museum (Natural History) are rich in Asilidae from most parts of Africa except the Congo Basin, and the present collections fill a noticeable gap, in the centre of the African continent. It is hoped, therefore, that this preliminary review will give some indication of what genera and species of Asilidae occur within the Congo Basin, and form convenient links with other papers on genera and species from other parts of Africa, south of the Sahara, which will be necessary before the Asilidae in the British Museum (Natural History) can be adequately identified.

The expression ' Congo Basin ' is used loosely to cover the geographical area drained by the Congo River. Biologically the fauna of the north-eastern corner (where the Garamba National Park is situated) has links with that of Uganda and Kenya ; species of the Congo Basin proper also extend into the rain forest areas of the Cameroons and southern Nigeria ; while the fauna of the Katanga uplands is linked with the Rhodesia highlands rather than with the lowland rain forest.

ABBREVIATIONS

The following abbreviations are used for various institutions and collections: IPNC = Institut des Parcs Nationaux (du Congo), Brussels ; MRAC = Musée royale de l'Afrique centrale, Brussels (Tervuren) ; IRSNB = Institut R. des Sciences naturelles de Belgique, Brussels ; FJF = collection of Monsieur F. J. François, Brussels ; BMNH = British Museum (Natural History), London ; SMNS = Staatliches Museum für Naturkunde in Stuttgart (Lindner collection) ; MCZH = Museum of Comparative Zoology, Harvard ; SAIMR = South African Institute for Medical Research, Johannesburg ; MHNP = Muséum national d'Histoire naturelle, Paris. Collectors' names are given, except in the material from the Garamba National Park, where all specimens not otherwise credited were collected by H. De Saeger.

ASILIDAE

Asilidae (Robber Flies) are attractive to the collector of insects because they are usually easily seen, and because they behave in interesting ways. All known members of the family are predatory, adults of both sexes feeding by sucking the body-fluids of other insects, and occasionally of spiders. Most of them capture their prey in flight, grasping it with the fore legs, piercing it with the proboscis, and sucking it dry. They feed either in continued flight, or after first alighting with their prey.

That this habit is well-established in the evolution of the Asilidae is shown by the degree to which their structure is adapted to an aerial, predatory life. The head, in particular, is highly functional in its structure. All Asilidae have the eyes separated, though sometimes closely approximated at one point. A characteristic of the family, by which Asilidae may be distinguished from, say, Therevidae, is the way in which the vertex of the head is sunk beneath the level of the eyes. Another way of expressing this is to say that the eyes are raised above the level of the head, and this is a more significant description, indicating that the eyes are specially developed in this family.

The *eyes* are of such a shape that a considerable area of each eye faces forwards, and these areas are equipped with facets larger than the rest (Text-figs 56, 57, 60). The appearance is such as to suggest a special acuity of vision in a forward direction, correlated with the need to identify prey, and to catch it in the air. Compared with many other Diptera, the eyes of Asilidae are generally flattened in front, thus exposing a greater proportion of the facets to the front and relatively few to the side, though these lateral facets are strongly curved, and so command a wide field of view.

These characteristics of the eyes are most exaggerated in the tribe Xenomyzini, where the effect of large, flattened eyes and tiny frons and face is usually described as being ' goggle-eyed '.

The *legs* of Asilidae are developed for the pursuit of prey. In general, they are stout and strong, in contrast to the fragile legs of such aerial insects as Bombyliidae. Nearly always they are covered with hairs and strong bristles, which obviously fulfil a practical function in holding the struggling prey, and preventing it from injuring its captor ; the characteristic ' moustache ' of the Asilidae, a mass of bristles just above the base of the proboscis, similarly keeps the prey away from the eyes and antennae of the robber fly.

In a few genera the legs have acquired additional devices for grasping prey. The most advanced example is in the genus *Gonioscelis*, where the fore femur is expanded basally and its ventral surface is heavily armed with spines and bristles, which meet the tibia to form a crab-like prehensile organ (Text-fig. 49). In *Hoplopheromerus* the mid-femur and tibia are equipped with long, spiny bristles. Many genera have the hind femur swollen and strong, with its curved tibia closing firmly on to it. This development has occurred, obviously independently, in genera of all tribes, sometimes, as in *Hoplistomerus*, with the spines carried on warts or other processes of the femur.

One of the most enigmatic of such devices is the fore tibial spur of certain genera of Saropogonini, including *Saropogon* itself. This formed the basis of Hermann's group Acanthocnemini : a convenient device for quick identification, but an unsatisfactory basis for a classification, since we still cannot say whether this tibial spur is a practical device—thus showing similarity of habit, or of prey—or a functionless relict from some ancestor, and thus an indicator of affinity. Some species of *Microstylum* (*Mimoscolia*) have a similar spur and terminal process on the mid-tibia (Text-fig. 39).

The *wings* of Asilidae are of primary importance in the taxonomy of the family, though the range of venational pattern is comparatively restricted. A discal cell is always present, and an almost full set of longitudinal veins : Sc, R_1, R_{2+3}, R_{4+5}, M_1, M_2, M_3, M_4, Cu_1, $1A$. Variations in venational pattern arise from the meeting of adjacent veins before they reach the wing-margin, and thus the closure of certain cells, of which the most important is the *marginal cell*, lying between the veins R_1 and R_{2+3} (Text-fig. 69).

The marginal cell is closed, with a short terminal stalk, in Asilini, Ommatiini, Atomosiini, and most Laphriini ; it is open, with veins R_1 and R_{2+3} reaching the wing-margin separately, in Leptogasterini, Saropogonini, Stichopogonini and Xenomyzini. In certain genera related to *Laphystia* this cell is normally open, though vein R_2+_3 has a characteristic retrograde curve. These genera comprise Hermann's group Prytaniinae and Hull's tribe Laphystiini, transitional between the old subfamilies of Laphriinae and Dasypogoninae. In most respects they are most closely related to Laphriini, and are here treated as belonging to that tribe.

It is generally assumed that open cells are a more primitive condition, and closure of cells is a specialization ; though of course this specialization has occurred independently in many different lines of evolution. The most generalized venation occurs in the Leptogasterini, where often all the cells are open, including the anal cell. The last is particularly variable, being sometimes divergently open, almost as in some Nematocera, but sometimes closed far from the wing-margin. Leptogasterini have lost the alula, and the shape of the wing and of individual forks and cells show clearly that being generalized cannot necessarily be equated with being primitive.

Leaving aside the Leptogasterini, which are a peripheral group, whether primitive or advanced, the central group of the family is the Saropogonini with Stichopogonini and Xenomyzini as specialized offshoots. Saropogonini include a diversity of genera, all of which have an open marginal cell, even though other venational specializations occur, e.g. in *Microstylum*.

The generally robust structure of Laphriini extends to the wings, where additional strength is often provided by the closure of both the first and fourth posterior cells (Text-figs 18–20). These must give considerable rigidity along the posterior area of the wing. On the other hand the actual wing margin, which in Asilidae is normally sclerotized into an ' ambient vein ', is membranous in a number of genera, especially in *Laphystia* and related genera.

Among Asilini the conspicuous peculiarity lies in the genera *Promachus*, *Alcimus*, *Philodicus* and *Apoclea*, where an additional vein unites the fork of R_{4+5} with the stem of R_{2+3}, producing three submarginal cells. Since Asilini are clearly an advanced tribe, which at specific level show signs of recent evolution, it would be reasonable to visualize this additional vein as a new structure, perhaps giving additional rigidity to the radial field of the wing. However, many Brachycera in different families have a stump vein on the radial fork, and sometimes a complete cross-vein : for example, some Bombyliidae, including the entire tribe Exoprosopini.

There has therefore been a temptation to look upon three submarginal cells as a primitive condition in Brachycera, from which the more usual two submarginal cells are derived by reduction. Shannon and Bromley (1924) regarded the *Promachus*-group of genera as evidence that the proper numbering of the branches of the radial sector should be : R_1, R_2, R_{3+4}, R_5. In this way Shannon & Bromley accepted it as axiomatic that the additional vein in these genera is a true vein, one of the ancestral complement.

In fact, supernumerary veins often occur in Brachycera. In Nemestrinidae they are a regular feature of certain genera. In Syrphidae the ' spurious vein ' is a family characteristic. Among Asilidae it is quite common to find supernumerary cross-veins, sometimes only in one wing. The small anterior cross-vein (*r–m*) is often duplicated. There is evidence that such veins appear during the pupal period, and are the result of sclerotization of a fold. On this interpretation it is suggested that the stump vein from the radial fork, when this is present, and even the complete vein in *Promachus* and its allied, are no more than this, and give no indication of phylogeny.

The *thorax* and *abdomen* of Asilidae show no remarkable features. The abdomen varies from slender and elongate in Leptogasterini, most Asilini and many other genera, to the extremely squat abdomen of genera such as *Sisyrnodytes*, in which the abdomen is short, broad, flattened, and bee-like in form.

With few exceptions, the *genitalia* of both sexes are exposed, and readily examined for purposes of classification. *Female terminalia* may be simple, or they may take the form of an ovipositor. Although an ovipositor may appear highly characteristic it is an adaptive character, suited to the requirements of egg-laying. The larvae of Asilidae live either in soil or in wood, but the eggs are laid in a variety of special sites. They may be simply dropped on to the ground, in which case the ovipositor is of very simple, lamellate structure. Many eggs are concealed in flowers, leaf-axils, or even inside a slit cut into the tissue of a plant : it seems that the object is concealment and protection of the egg, and possibly of the first instar larva. Many of the more striking ovipositors, which are most frequent in the advanced tribe Asilini, are adapted to the circumstances of oviposition. The manner of oviposition may be quite different in related genera, or even within a single genus, and so ovipositors are unreliable indicators of relationships.

Male genitalia present a complicated problem. They are constructed mainly from the ninth segment. The ninth tergite, or *epandrium*, is sometimes entire, sometimes split into the *superior forceps*. From the ninth sternite arises a pair of *inferior forceps* (*gonopods*) which often appear double because each bears on its inner surface an accessory lobe, the *clasper*. Within the two claspers appear the *aedeagus* and its two *parameres*. The basic pattern is thus that of a trifid median structure, flanked by three pairs of lobes, and topped (dorsally) by a median pad formed from the paired *anal lamellae* (proctiger).

The variations upon this basic structure are extensive, and are made more confusing by partial or complete *inversion*. Thus in Laphriini the typical genital structure is boat-shaped, the apparent hull of the boat consisting of the undivided ninth tergite (*epandrium*), which has become inverted and appears to house the other (ventral) appendages (Text-figs 3–36).

The problem of *rotation* of male genitalia in Diptera, leading to inversion, has received undue prominence in textbooks, more especially in regard to muscoid flies. Rotation may be a source of confusion in comparative morphology, but—at least in Asilidae—it is usually possible to distinguish between the true dorsal aspect, with the lamellae, and the true ventral aspect, with the gonopods and claspers. As an indication of relationships, rotation is an unsafe guide. In many genera rotation occurs during mating : i.e. the genitalia of the two sexes are engaged, and then the male changes position, twisting the genitalia in the process. This rotation may be partial or total, depending upon the mating attitudes, and may or may not persist during later life, or after death. Consequently no attention should be paid to rotation *per se*, beyond ensuring that the correct orientation of the parts is understood before they are compared with others.

The specific identification of Asilidae is much more difficult than is generally thought, and possibly for this reason this attractive family has not been as extensively studied as, say Syrphidae. No large scale revision of African Asilidae has ever appeared, and in every genus the student is faced with a dilemma : if few species are known, then material is scarce, and comparison difficult ; if material is abundant, as in *Ommatius* and *Neolaparus*, the variation is so great that specific identification is not possible until the whole genus has been revised.

Substantial progress in knowledge of African Asilidae will come only from complete revisions of successive genera.

THE ASILIDAE OF THE CONGO BASIN

The collections of the British Museum (Natural History) include much material from Africa south of the Sahara, but for historical reasons little of this comes from the area of the Congo Basin. The writing of the present paper seemed to provide an opportunity to review the Asilidae of this larger and important natural region of central Africa, which would be complementary to later studies that it was hoped to make of Asilidae from the rest of the Ethiopian Region.

Unfortunately as the work progressed it became evident that a number of genera were insufficiently known for a definitive review to be possible. The outstanding example is the genus *Neolaparus*, flies of deceptively simple appearance which so far have resisted all attempts at a classification. Only a thorough study of all the African species, with an attempt to find new taxonomic characters, will make it possible to rationalize this genus. *Ommatius* is more tractable, but there is an abundance of species, many of which are clearly of wide distribution. These and several other genera must be revised for the entire region before it will be possible to deal adequately with any faunistic survey.

The material described in the present paper, therefore, consists of the collections of the Mission H. De Saeger from the Parc National Du Garamba, together with such other material as could be handled satisfactorily at the same time. Whenever possible I have given a key to species, from this collection, or from the Congo Basin, and in some genera a key to all the known species from the Ethiopian Region.

One fact that clearly emerges from this study is that there is no fauna of Asilidae that is characteristic of the Congo Basin, or even of the equatorial forest belt as a whole. The distribution of Asilidae resembles that of Tabanidae : both families seem to flourish best in savanna country, with an open, mixed vegetation, which provides a multiplicity of habitats.

There are interesting parallels between the tribe Laphriini of the Asilidae and the genus *Chrysops* of the Tabanidae. *Chrysops* spp. are known as ' deer flies ' in North America because their typical habitat is the open woodland in which deer abound, and Laphriini, with their wood-living larvae, are characteristic of this habitat. *Chrysops* has invaded the high forest by way of the tree-canopy, coming down to ground level where the canopy is broken by rivers, by clearings, or by the outcropping of rocky or mountainous areas which bring ground level up to the canopy of the surrounding forest. It would be interesting to discover whether the high canopy of the Congo Basin also supports a large population of Laphriini, which fly among the tree-tops and prey upon the Hymenoptera and other insects feeding on the flowers of the forest trees.

The Parc National du Garamba is not situated in high forest, and has not much open woodland. It is mostly park savanna, i.e. predominantly grassland with scattered trees (Exploration du Parc National du Garamba ; Afdelung Introduction,

p. 101 ; pls. III–XII). It is noteworthy that Laphriini are poorly represented within the confines of the Parc, though they are numerous among collections from elsewhere in the Congo Basin.

The Asilidae of the Parc National du Garamba are mainly Saropogonini, Stichopogonini, Xenomyzini and Asilini, and belong to genera which have a wide distribution throughout the savanna areas of Africa. It is these genera (e.g. *Neolaparus, Ommatius*) that cannot be comprehensively treated in the present paper, because the Garamba fauna is a small and unrepresentative sample of a very extensive and difficult range of species.

Key to the Tribes of African Asilidae[1]

1 Marginal cell of the wing open 2
– Marginal cell of the wing closed 6
2 Pulvilli absent. Very narrow, elongate flies . . . **LEPTOGASTERINI** (p. 215)
– Pulvilli nearly always present ; if absent, flies of different shape 3
3 Prosternum isolated, and surrounded by membrane (between front coxae). Female with ninth tergite divided into spine-bearing plates (acanthophorites) **SAROPOGONINI** (p. 257)
– Prosternum complete, with little or no membranous area 4
4 Vertex of head saddle-shaped. Dusty grey flies, living in sand or on rocks. (Text-figs 53, 56, 57, 60) . . . . **STICHOPOGONINI** (p. 281)
– Vertex not saddle-shaped 5
5 Flies with small face and frons and very large ' goggle ' eyes. **XENOMYZINI** (p. 285)
– Head and eyes not of this shape . some **LAPHRIINI** (**LAPHYSTIINI**) (p. 224)
6 Antennae blunt or club-shaped. Often with mesopleural bristles 7
– Antennae with slender arista, sometimes feathered 8
7 Vein M_3 straight and parallel with outer vein of discal cell. Small flies, rather like sawflies . . . . **ATOMOSIINI** (p. 257)
– Vein M_3 curved, not parallel with outer margin of discal cell . **LAPHRIINI** (p. 224)
8 Arista of antennae feathered . . . . **OMMATIINI** (p. 313)
– Arista of antennae bare . . . . **ASILINI** (p. 297)

Tribe **LEPTOGASTERINI**

Members of this tribe have a characteristic habitus, which sets them apart from nearly all other Asilidae. The abdomen is long and slender, usually slightly clubbed apically. The wings are generally narrow, with the anal lobe and alula evanescent, and with a simplicity of venation in which even the anal cell is often wide open. The legs are slender and elongate, especially the hind pair, of which the femora and tibiae may be clavate. Pulvilli are always absent, and the empodium may be absent or greatly reduced. The metanotum and postmetacoxal area are flattened obliquely, in such a way that the coxae are pushed forwards, and the base of the abdomen raised, contributing to what has been called the ' agrionid ' appearance of these flies. The thorax of many Leptogasterini is further distorted by having the dorsum compressed into a hump, and by the development of a pair of processes on the mesonotum which overlap the pronotum ; in the genus *Euscelidia* a process of the pronotum lies between them.

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[1] For a fuller account of tribal classification, and a bibliography see Oldroyd (1963).

To a great extent these features of Leptogasterini are clearly adaptive. The tarsi, for instance, are adapted for curling securely round a grass stem, in which process they are actively assisted by the long, curved claws, and by the loss of pulvilli.

Dipterists who have specially studied Leptogasterini have been led to emphasize the differences between these and all other Asilidae. Janssens (1954 : 114) stated an extreme view : ' Je considère . . . qu'il y avait lieu peut-être d'instituer pour *Leptogaster* et quelques voisins une famille qui formera avec les Asilidae une super-familie ASILOIDEA '. Martin (1968) developed this view at some length, but Oldroyd (1969) examined Martin's argument in detail, and endorsed the view of Hull (1962 : 296) that : ' All these characters are collectively found in Leptogasterinae, but are singly shared with other asilids '.

The subdivision of Leptogasterini into genera is also unexpectedly difficult. The key given by Oldroyd (1963 : 8) is unsatisfactory in some particulars, and fails to locate generically any species with the following combination of characters : occiput with fine hairs only, without bristles ; no bifid pronotal process ; and no swollen or plumate hind legs. Such specimens might be regarded either as *Leptogaster* without occipital bristles or as *Euscelidia* without the pronotal process ; sometimes the general impression is of the former, sometimes of the latter.

In the present paper the genera are interpreted as in Janssens' papers, and all species which lack the pronotal process, and have the anal cell widely open, are classed as *Leptogaster*, whether or not they have strong occipital bristles.

KEY TO THE AFRICAN GENERA OF LEPTOGASTERINI

1 Prothorax with a bifid process, which arises between the two processes of the mesonotum . . . . ***EUSCELIDIA*** Westwood (p. 219)
– Prothorax without any process between the two processes of the mesonotum . . 2
2 Legs swollen or ornamented 3
– Legs neither swollen nor ornamented 4
3 Hind femora and tibiae strongly swollen, with thick, erect hairs ***LASIOCNEMUS*** Loew (p. 223)
– Hind femora not strongly swollen, but distinctly elongate. Hind tibiae and tarsi with conspicuous plumes . . . . . ***DOLICHOSCIUS*** Janssens (p. 223)
4 Anal cell of the wing open. Mostly small, rather sombre flies ***LEPTOGASTER*** Meigen (p. 216)
– Anal cell of the wing closed and stalked. Mostly large, or very large, brightly coloured flies . . . . . ***AMMOPHILOMIMA*** Enderlein (p. 219)

LEPTOGASTER Meigen

Leptogaster Meigen, 1803 : 269. Type-species : *Asilus cylindricus* De Geer, 1776, monotypic as *Asilus tipuloides* Fabricius, 1775.

Gonypes Latreille, 1805 : 309. Type-species : *Asilus cylindricus* De Geer, 1776, monotypic as *Asilus tipuloides* Fabricius, 1775

Very few species of *Leptogaster* had been recorded from the Congo Basin until Janssens described twenty-five species in a series of papers (1952–57). Many of these are known from unique specimens, and only a study of much more extensive material will make it possible to indicate the extent of intraspecific variation, or the distribution of species within the area. In the meantime the following key, compiled from the published descriptions, is offered as a guide to provisional identification. In addition to Janssens' species there are *L. ludens* Curran (1927 : 1) —a single female from Banana, at the Congo mouth—*L. bicingulata* Bezzi (1905 : 279) described from Eritrea and recorded by Janssens from Kitega ; and *L. pictipennis* Loew (1857 : 353) described from S. Africa, and also recorded by Janssens from Bururi.

KEY TO THE SPECIES OF *LEPTOGASTER* DESCRIBED BY JANSSENS

1 Mesonotum matt, sometimes with pattern of tomentum 2
– Mesonotum shining, or with shining stripes 10
2 Empodium very small, or absent. Arista as long as all three antennal segments together . . . . **aristalis**, 1957 : 10
(both from Eala, and difficult to separate) . . . . . **ealensis**, 1954 : 303
– Empodium distinct, usually about half as long as claws 3
3 Mesonotum matt brown or black, with or without indistinct pattern. Hind femora with darker tip or band 4
– Mesonotum red or brown, with three darker stripes. Hind femora uniform . . 8
4 Moustache composed of eight long, black hairs. Occipital bristles unusually strong **melanomystax**, 1954 : 133
– Moustache pale, occipital bristles weak 3
5 Wings darkened in *basal* two-thirds, leaving tip pale . . . . **fumosa**, 1954 : 302
– Wings either clear, or almost uniformly tinted, with *tip* sometimes darker . . 6
6 Hind femora gradually darkened towards tip. Wings smoky . . **plebeja**, 1957 : 9
– Hind femora with distinct subapical dark ring 7
7 Face and proboscis dark. Abdomen pitch-black . . **evanescens**, 1954 : 127
– Face grey and proboscis red-brown. Abdomen olive-grey with grey pubescence, especially posteriorly . . . . **urundiana**, 1953 : 7
8 Empodium half as long as claws. Vein R_{2+3} curved forwards at tip 9
– Empodium tiny, and vein R_{2+3} curved backwards at tip . . **velutina**, 1954 : 127
9 Occiput with a row of unusually stiff bristles. Body generally covered with silky grey or whitish hairs . . . . **puella**, 1953 : 6
– Occiput with a few dark hairs. Body generally dark, without silky appearance **rufescens**, 1954 : 125 (p. 218)
10 Hind femora uniformly coloured 11
– Hind femora banded, striped, or merely becoming progressively darker towards tip 14
11 Wings clear 12
– Wings more or less tinted 13
12 Hind tibiae thickest in middle, tapering towards base and tip **pallipes**, 1953 : 9 (p. 218)
– Hind tibiae thickest at tip. Thorax with two strong bristles posteriorly **rufa**, 1953 : 9, **schoutedeni**, 1954 : 401
13 Thorax black . . . . **sericea**, 1954 : 131
– Thorax clear, translucent yellow-brown . . . . . . **pellucida**, 1954 : 132
14 Mesonotum with dark pattern of stripes or spots 15
– Mesonotum without pattern, though sometimes paler at sides, or with a *bare* stripe 17
15 Mesonotum with silvery spots of tomentum, and also with numerous small bare spots **hermelina**, 1954 : 130
– Mesonotum without spots 16
16 Mesonotum brilliant yellow, with triple black stripe. Hind femora yellow with indistinct band . . . . **vindex**, 1954 : 15

– Mesonotum dark brown, with a darker stripe. Hind femora reddish brown with dark band . . . . ***pilicnemis***, 1954 : 129
17 Wings brown at tip. Mesonotum black with grey tomentum, which leaves a bare stripe . . . . ***apicalis***, 1954 : 132
– Wings not brown at tip, clear, or uniformly tinted 18
18 Bronze and sepia species, hind femora with longitudinal stripe . ***upembana***, 1954 : 128
– Without bronze colouration or longitudinal stripe on femora 19
19 Hind femora and tibiae with a strongly marked dark ring near tip . . . 20
– Hind femora only indistinctly darker towards tip 21
20 Mesonotum black with yellow tomentum, which becomes silvery on pleura. A robust species of 10 mm. Hind femora conspicuously knobbed, and with two rows of black spines ventrally . . . . . ***penicillata***, 1954 : 130 (p. 218)
– Mesonotum red, with weak yellowish tomentum on pleura. A fragile species of 6 mm. Hind femora not conspicuously knobbed, and without ventral spines ***stichosoma***, 1957 : 6
21 Empodium vestigial 22
– Empodium more than half as long as claws . . . . . . ***pyragra***, 1957 : 8
22 Hind basitarsus as long as preceding four tarsomeres together ***tarsalis***, 1954 : 29 (p. 218)

– Hind basitarsus normal . . . . ***basilewskyi***, 1955 : 304

The following species were represented in the collections from the Garamba National Park :

Leptogaster pallipes Janssens

Leptogaster pallipes Janssens, 1953 : 9.

Garamba National Park : P.N.G., 1849, 1 ♂, 1 ♀, 31.v.1951 (*J. Verschuren*), 3612, Iso III, 1 ♀, ii.vi. 1952 (IPNC).

Leptogaster penicillata Janssens

Leptogaster penicillata Janssens, 1954 : 130.

Garamba National Park : P.N.G., 195, 1/c/2''', 1 ♀, 3.1.1950 ; 1276, III/gd/2, 1 ♂, 19.ii.1951 ; 1334, II/gd/4, 1 ♀, 6.iii.1951 ; 2861, II/hd/4, 1 ♀, 6.xii.1951 ; 2944, 1 ex., II/gd/4, 27.xii.1951 ; 3077, II/gd/10, 1 ex., 30.i.1952 (IPNC).

Leptogaster tarsalis Janssens

Leptogaster tarsalis Janssens, 1953 : 129.

The following three specimens may probably be assigned to this species, though the third specimen, a female, is larger and more robust than the others. All three show a characteristic narrowing of the second submarginal cell, veins R_4 and R_5 both being curved and approximated at the wing-tip.

Garamba National Park : P.N.G., 199, I/a/3, 1 ♂, 7.ix.1950 ; 2991, II/fd/17, 1 ex., 3.i.1952 ; 529, Akam., 1 ♀, 19.v.1950 (IPNC).

Leptogaster rufescens Janssens

Leptogaster rufescens Janssens, 1954 : 125.

Garamba National Park : P.N.G., 1474, II/ge/2, 1 ♀, 31.iii.1951 ; 2102, II/fd/3, 1 ♀, 16.vii.1951 ; 2107, II/hd/4, 1 ♀, 17.viii.1951, 2 ex. ; 2160, II/gd/11, 1 ♂, 28.vii.1951 ; 2223, II/fd/4, 1 ♂, 8.viii.1951 ; 3488, Inimvua, 1 ♀, 20.v.1952 ; 3606, Mt Tungu (S), 1 ♂, 9.vi.1952 ; 3964, II/gd/4, 1 ♂, 1 ♀, 23.viii.1952 (IPNC).

AMMOPHILOMIMA Enderlein

Ammophilomima Enderlein, 1914 : 155. Type-species : *Ammophilomima imitatrix* Enderlein, 1914, by original designation.

? *Lagynogaster* Hermann, 1917 : 12. Type-species : *Lagynogaster fuliginosa* Hermann, 1917, by original designation.

In his revision of *Ammophilomima*, Janssens (1953*b* : 1–12) discussed the supposed differences between Enderlein's genus *Ammophilomima* and Hermann's *Lagynogaster*, and concluded that probably these two '. . ne sont qu'un seul et même genre '. Janssens described two species from the collections of the Staatssammlung in Munich, where they bore manuscript names given them by Hermann, but which had never been published.

Although *eumenoides* was based upon a specimen from Malawi, and *imitatrix* from the Cameroons, Janssens records all the species in his key from the region of Eala, in the Congo Basin. Here is a translation of his key :

KEY TO SPECIES OF *AMMOPHILOMIMA*

1	Hind femora encircled with a yellow band	2
–	Hind femora not encircled with a yellow band	7
2	Hind tibiae with a yellow apex	3
–	Hind tibiae without any yellow apex	5
3	Stigma filling the whole of the subcostal cell	4
–	Stigma confined to tip of subcostal vein	***imitatrix*** Enderlein
4	Empodium longer than half length of claws. Wings brown. Hind legs black and yellow	***straeleni*** Janssens
–	Empodium less than half length of claws. Hind legs brown and bistre (sooty brown). Wings hyaline	***evanescens*** Janssens
5	Hind basitarus largely bistre	6
–	Hind basitarus entirely brown	***ghesquierei*** Janssens
6	Mesonotum unicolorous	***aequinoctialis*** Janssens
–	Mesonotum bearing a large black spot in the shape of a trident	***basilewskyi*** Janssens
7	Antennae uniformly reddish yellow	***eumenoides*** Janssens (p. 219)
–	Antennae darker	***auripennis*** Janssens ***montana*** Janssens

The collections from the Garamba National Park contained specimens of *A. eumenoides.*

Ammophilomima eumenoides Janssens

Ammophilomina eumenoides Janssens, 1953 : 4.

Garamba National Park : P.N.G., 3311, PPk. 73/d/9, 2 ♀, 8.iv.52 ; 3623, Iso II/2, 1 ♀, 18.vi.1952 (IPNC).

EUSCELIDIA Westwood

Euscelidia Westwood, 1849 : 232. Type-species : *Euscelidia rapax* Westwood, monotypic.

Species of *Euscelidia* are usually recognizable by their general appearance, as robust and shining Leptogasterines. The type-species and a few others have hairy hind legs, which could lead to confusion with *Lasiocnemus*, but the existence of a vertical process of the pronotum projecting between the two processes of the mesonotum is diagnostic.

About eight or nine species of *Euscelidia* have been recorded from the Congo Basin, most of them described in various papers by Janssens. The differences in colour and pattern are more subtle than in *Leptogaster*, and it is not practicable to attempt a key compiled from descriptions. Only a detailed study of species both in the Congo Basin and outside it, with comparisons of genitalia, will make such a key possible. Meanwhile species must be named by direct comparison with Janssen's descriptions and figures.

The collection from the Garamba National Park contained two of Janssens species and two others that are clearly new.

Euscelidia bicolor Janssens

Euscelidia bicolor Janssens, 1954 : 123.

GARAMBA NATIONAL PARK : P.N.G., 3844, Mt Moyo, 2 ♂, 29.vii.52 (IPNC).

The wings are more heavily infuscated than is indicated in the original description.

Euscelidia festiva Janssens

Euscelidia festiva Janssens, 1954 : 123.

GARAMBA NATIONAL PARK : P.N.G., 529, Akam, 1 ♂, 19.v.1950 ; 848, I/b/2, 1 ♀, 27.ix.50 (*G. Demoulin*) ; 895, Napokomweli, 1 ♂, 1 ♀, 18.x.50 (*G. Demoulin*) ; 3612, Iso III, 1 ♂, 11.xi.52 ; 3642, Iso/II/11, 1 ex., 16.vi.1952 (IPNC).

***Euscelidia dorata* sp. n.**

(Text-fig. 1)

A yellow-brown species, greatly resembling *Leptogaster rufescens* Janssens, but with a distinct pronotal process, and without any strong occipital bristles. Its nearest relative among Janssens' species of *Euscelidia* is *E. bicolor*, from which *dorata* differs in having the thorax yellow-brown, tomented, and a very sparse moustache.

♂ *Head.* Frons with dense golden brown tomentum ; ocellar tubercle black, with sparse golden tomentum, and no ocellar bristles. Face tomented brownish, silvery when seen obliquely ; almost plane, with a tiny tubercle on mouth-margin, which bears a sparse moustache of about four brownish bristles. Proboscis and palpi clear brown. Occiput with dense tomentum, grey-brown, with no bristles at all, and only sparse, short, yellowish brown hairs. Antennae brown with black hairs ; third segment same length as arista, each equal to sum of first two segments.

Thorax yellow-brown both in ground colour and in tomentum. Mesonotum quite strongly humped, tomented, without distinct pattern, but with an indistinct yellowish median stripe. Bristles yellow (almost all broken off in specimens available) : 1 notopleural, 1 intra-alar, 1 ? postalar : fine, short, yellow hairs disposed in humeral areas and along lines of dorsocentrals. Scutellum with a distinct discal furrow, yellowish brown in ground colour, with whitish tomentum, short yellow hairs, and no discal bristles. Pleura yellow-brown with dense whitish tomentum and only sparse, fine, yellow hairs.

Abdomen. First five segments tubular, yellow-brown, shining through thin yellow tomentum, and with fine black hairs ; sixth and following segments more clavate, dark brown, with hairs longer and mostly yellow ; venter similar, but more yellowish and with yellow hairs. Genitalia (Text-fig. 1) mahogany-brown.

Legs clear yellow-brown : only tips of tarsi and of hind tibiae rather deeper brown. Hind femora and tibiae distinctly clavate. All legs clothed with rather long hairs, which are mostly clear, but may appear black when silhouetted against the light.

Wings almost clear of pigment, but extensively covered with microtrichiae, especially in apical half. Halteres with yellow stalk and brownish knob.

Length of body 10 mm ; of wing 7 mm.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 2644, II/fd/15, 22.ix.51 (IPNC).

Paratypes. GARAMBA NATIONAL PARK : 208, 1/b/1, 1 ♀, 15.ii.1950 (*G. Demoulin*) ; 998, II/d/6, 1 ?, 21.xii.50 (*J. Verschuren*) ; 949, II/c/, 1 ♂, 21.xii.50 (*J. Verschuren*) ; 1260, II/fc/6ar, 1 ♂, 16.ii.1951 (*J. Verschuren*) ; 1272, II/ed/14, 1 ♀, 17.ii.1951 ; 1576, II/fb/4, 1 ?, 19.iv.1951 (*J. Verschuren*) ; 1633, II/ee/7, 6 ♀, 27.iv.1961 (*J. Verschuren*) ; 2024, II/gd/14, 3 ♀, 30.vi.1951 ; 2051, II/ge/6, 1 ♀, 10.vii.1951 ; 2071, II/gd/11, 1 ♂, 12.vii.1951 ; 2464, II/fd/15, 1 ♀, 12.ix.1951 ; 2780, II/gd/4, 1 ♂, 23.ix.1951 ; 2935, II/fd/10. 1 ♀, 20.xii.1951 ; 2841, II/fc/6, 2 ♀, 26.xii.1951 (*J. Verschuren*) (IPNC).

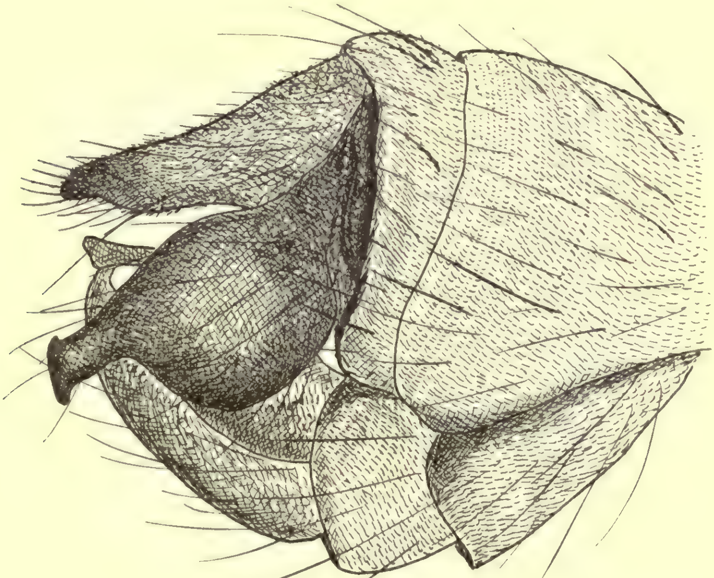

FIG. 1. *Euscelidia dorata.* Male genitalia.

Euscelidia moyoensis sp. n.

(Text-fig. 2)

A species with shining black thorax, and legs extensively marked in black, distinguished from the other species known to me by the distinct black band at the extreme tip of the hind femora. From *E. lucida* Oldroyd it differs in the much less evident pattern of tomentum on the thorax, the more prominent silky hairs of the anterior sternopleuron, and the more abundant pale hairs of the moustache. It also has close affinities with *E. datis* (Walk.) from Sierra Leone, but cannot be compared in great detail because the unique type of the latter is too badly damaged : the fore and middle legs of *moyoensis* seem to be much more heavily infuscated.

♂ *Head*. Frons and face with golden tomentum ; moustache a row of 15–20 white bristles on mouth-margin : no other facial or frontal hairs. Antennae (broken), palpi and proboscis black, with black hairs. Occiput with golden tomentum and fine yellow hairs.

Thorax. Mesonotum mostly shining black, with yellow tomentum only at extreme sides, and particularly anteriorly, and on humeral slopes ; long, golden hairs lie vertically, and long, yellowish white hairs arise from tomented areas ; rest of dorsum with short, black hairs. Scutellum covered with yellowish white tomentum, with erect, curved yellowish hairs on disc and on margin. Pronotum, including median lobe and twin lobes of mesonotum, covered with whitish tomentum, which also covers pleura. Mesopleuron, pteropleuron and anterior part of sternopleuron also with conspicuous tufts of long, snow-white hairs.

Abdomen in ground colour black, with yellow basally on third and fourth segments, the whole covered with whitish tomentum. Hairs mostly white, some black dorsally, longer laterally and on sternites, which are a little more yellow than tergites. Male genitalia (Text-fig. 2) black.

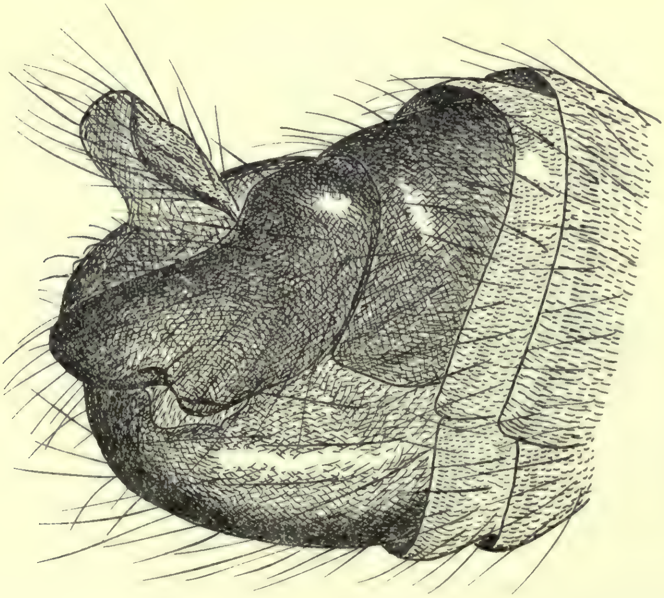

FIG. 2. *Euscelidia moyoensis*. Male genitalia.

Legs. A pattern of whitish yellow, deep honey-yellow, and black-brown. Black-brown covers extreme tips of fore and hind femora, most of mid femora except bases, a median ventral patch on inner face of each hind femur, anterior and posterior stripes on all tibiae, tips of all basitarsi, and all other tarsomeres. Hind femora with narrow, whitish yellow stem, deep yellow, elongate knob, and small, apical, black-brown band. All basitarsi conspicuously whitish yellow, except for extreme tip, which is black-brown. White bristles on tibiae, but tarsal bristles black.

Wings. Uniformly, but faintly smoky. Halteres red-brown.

Length of body 12 mm ; of wing 8 mm.

Holotype ♂. Garamba National Park : P.N.G., 3844, Mt Moyo, 29.vii.52 (IPNC).

DOLICHOSCIUS Janssens

Dolichoscius Janssens, 1953 : 2. Type-species : *Dolichoscius francoisi* Janssens, 1953, monotypic.

Janssens has described two species of *Dolichoscius* in two separate papers. He clearly intended the type-species to be *longipes*, from the Upemba National Park, but unfortunately this paper (1954) did not appear until after the description of *francoisi* from Urundi, which becomes the type-species by monotypy.

Dolichoscius francoisi Janssens, 1953 : 2, Urundi.

Dolichoscius longipes Janssens, 1954 : 120, Upemba.

LASIOCNEMUS Loew

Lasiocnemus Loew, 1951 : 2. Type-species : *Lasiocnemus obscuripennis* Loew, 1851, by original designation.

Although Janssens (1952 : 6–10) records several species of *Lasiocnemus* from the Congo Basin, including such species as *L. lugens* Loew, which were originally described from distant parts of Africa, there were no species among the material from the Upemba National Park (Janssens, 1954), and none in the collections from Garamba.

For the sake of completeness in this review, therefore, I can only quote Janssens' key to the species recorded by him from the Congo Basin.

Key to Species of *LASIOCNEMUS* from the Congo Basin

1	Wings clear, except for a stigma at tip of subcostal vein	***hyalipennis*** Janssens
–	Wings smoky	2
2	Wings uniformly smoky	***hermanni*** Janssens
–	Wings with some kind of pattern	3
3	Wings with separated clear flecks	4
–	Wings with a hyaline crossband	6
4	Legs uniformly black, or dark brown	5
–	Legs clear brown, with brown markings on hind femora and tibiae. (Wings with two large clear spots which almost form a crossband)	***fascipennis*** Engel & Cuthbertson, 1939 : 185
5	Face with brown pubescence ; halteres black ; empodium equal to three-quarters of length of claws	***lugens*** Loew 1857 : 353

– Face with white pubescence ; halteres pale yellow ; empodium almost as long as claws . . . . **obscuripennis** Loew, 1851 : 2

6 Transverse clear band of wings in the form of an elongate triangle. Pubescence of hind tibiae grey apically . . . . . **griseicinctipes** Speiser, 1913 : 141

– Transverse clear band of wings irregular. Pubescence of hind tibiae reddish apically. Empodium not half as long as claws . . . . **anthracinus** Janssens, 1952 : 9

Tribe LAPHRIINI

More than one third of the species recorded in the present paper belong to the tribe Laphriini. Although this proportion is exaggerated by the fact that certain big genera of other tribes—notably *Neolaparus* and *Ommatius*—cannot at present be reported upon so fully, yet the abundance of Laphriini underlines the fact that these genera flourish among trees. Many, perhaps most of them, spend their larval life in the stumps of fallen logs, often in the burrows made by wood-boring beetles and carpenter-bees.

Most Laphriini are distinctive in appearance, broadly built, often with the abdomen basally constricted ; wings strong, with stout veins, marginal and fifth posterior cells closed ; legs often stout, with inflated femora and curved tibiae ; and antennae stout, often clavate. The body surface is toughly sclerotized, and often punctate, giving the appearance of a strong, aggressive insect, with more than a superficial resemblance to a wasp or a bee.

Laphriini can usually be recognized by the combination of closed marginal cell and styliform antennae, in contrast to the aristiform antennae of the Asilini, and the open marginal cell of other tribes. It has been explained above (Introduction) that the present concept of Laphriini includes not only the tribes Andrenosomini and Ctenotini of Hull (1962), but also the more controversial ' Prytaniinae ' of Hermann, the tribe Laphystiini of Hull and others. On the other hand the Atomosiini, apparently only slightly separated by the small details of wing-venation, sustain this distinction on a world scale, though they are scarce in tropical Africa, and only one species is included in the present paper (see below).

KEY TO GENERA OF AFRICAN LAPHRIINI

1 Proboscis flattened into a blade like a paper-knife, with its edges dorsal and ventral 2

– Proboscis triangular in cross-section, with a flat surface ventrally. Sometimes curved upwards into a sickle-shape 4

2 Face gently swollen up to base of antennal tubercle. Large, hairy, bee-like flies **DASYLLINA** Bromley (p. 231)

– Face abruptly swollen into a knob that occupies only lower half 3

3 Antennae conspicuously elongate. Abdomen constricted between segments 2–3, giving a wasp-like appearance. Margin of scutellum with very short hairs, or none at all. Hind femora with tuberculate spines as in *Hoplistomerus* **STORTHYNGOMERUS** Hermann (p. 231)

– Antennae not conspicuously elongate ; third segment often rather plump. Abdomen seldom constricted, and then it is between 1–2 segments. Margin of scutellum usually with long hairs or fine bristles . . . . . **LAPHRIA** Meigen (p. 226)

4 Costa of wing not thickened as far as tip of vein R_5, and entire hind margin membranous. First posterior cell closed and stalked 5

– Costa of wing thickened at least as far as vein M_4, or beyond 9

5 Claws blunt at tip. Vein M_2 of wing nearly always cut short before reaching wing-margin. Palpi with only one segment (Text-fig. 25). Lower margin of occiput produced into a rim . . . ***CTENOTA*** Loew
– Claws pointed at tip. Vein M_2 of wing reaching margin, or almost so. Palpi with two segments (Text-fig. 24). Lower margin of occiput not produced . . . 6
6 Hind femora very strongly swollen. Third antennal segment hairy above ***LAXENECERA*** Macquart (p. 235)
– Hind femora not strongly swollen. Third antennal segment bare above . . . 7
7 Scutellum with long marginal bristles. Face smoothly rounded, with a moustache of strong bristles extending up to antennae. Third antennal segment clavate, with two-segmented style . . ***NUSA*** Walker (***DASYTHRIX*** Loew) (p. 243)
– Scutellum without marginal bristles . . . 8
8 Abdomen with a clump of strong bristles on first segment only. Moustache consisting of a row of strong bristles along mouth margin, and a mass of soft, silky hairs above these . . . ***PERASIS*** Hermann (***SAUCROPOGON*** Hull) (p. 244)
– Abdomen with strong lateral bristles on several other segments beyond first. Moustache consisting of hairs and bristles mingled. Often no pulvilli ***GLYPHOTRICLIS*** Hermann
9 Pulvilli absent ; claws long and slender. Vein M_3 parallel to outer end of discal cell, and often in line with it . . . ***ANYPODETUS*** Hermann
– Pulvilli present . . . 10
10 Costa extends round hind margin of wing at most as far as vein $Cu + IA$: axillary cell has no vein along its outer margin . . . 11
– Costa extends round axillary cell . . . 16
11 First posterior cell of wing open on margin. Palpi thicker at tip than at base . 12
– First posterior cell of wing closed on or before wing-margin . . . 13
12 Hind femora slender . . . ***LAPHYSTIA*** Loew
– Hind femora distinctly swollen . . . ***GERROLASIUS*** Hermann
13 Hind femora conspicuously swollen . . . 14
– Hind femora not conspicuously swollen . . . 15
14 Hind femora with strong, spine-bearing tubercles ventrally. Hind basitarus as long as next three segments together. Proboscis as long as face, which is not swollen ***HOPLISTOMERUS*** Macquart (p. 246)
– Hind femora swollen, and with bristles, but not arising from tubercles. Hind basitarsus not much longer than one segment. Proboscis shorter than face, which is distinctly swollen . . . ***TRICHARDIS*** Hermann (p. 247)
15 Palpi large and inflated, ovoid . . ***AFROMELITTODES*** Oldroyd & van Bruggen
– Palpi pointed at tip . . . some ***LAPHYSTIA*** Loew
16 Lower occiput with a backwardly-projecting flange. Palpi with only a single segment (Ctenotini of Hull, 1962) . . . 17
– Lower occiput rounded, sometimes slightly bulbous, but never with a flange. Palpi with two segments . . . 19
17 Claws noticeably blunt at tip . . . 18
– Claws pointed. Abdomen club-shaped, becoming broader posteriorly. Legs elongate, especially hind pair . . . ***LAMYRA*** Loew
18 Vein M_2 cut short before it reaches the wing-margin. Ground colour of body mostly obscurred by scaly hairs. Third antennal segment short, club-shaped, little longer than first two segments together . . . ***CTENOTA*** Loew
– Vein M_2 complete. Ground colour of body clearly visible between sparse hairs. Third antennal segment elongate, 3–4 times as long as first two segments together ***PARACTENOTA*** Engel ; ***STIPHROLAMYRA*** Engel
19 Veins closing discal cell parallel to, or even in line with vein, M_3, which closes fourth posterior cell . . . ***ORTHOGONIS*** Hermann
– These veins not parallel ; vein M_3 distinctly curved . . . 20

20 Face with prominent knob, at least on mouth-margin. Palpi leaf-like 21
– Face without prominent knob. Palpi cylindrical 23
21 Plump, hairy flies, mimicking carpenter-bees (*Xylocopa*). Legs short, densely fringed with hairs . ***HYPERECHIA*** Schiner (p. 249) ; ***SYSTROPALPUS*** Hull
– Elongate, bare or only moderately hairy flies, with long, slender legs 22
22 Proboscis curved upwards like a scimitar . . . ***PROAGONISTES*** Loew (p. 251)
– Proboscis straight . . . . ***ANDRENOSOMA*** Rondani (p. 255)
23 Metanotal callosities hairy or bristly ***KATHARMA*** Oldroyd ; ***CENOCHROMYIA*** Hermann[2]
– Metanotal callosities bare 24
24 Third antennal segment hairy dorsally. Hind femora swollen ***LAXENECERA*** Macquart (p. 235)
– Third antennal segment without hairs dorsally. Hind femora slender ***SMERYNGOLAPHRIA*** Hermann (p. 234)

LAPHRIA Meigen

Laphria Meigen, 1803 : 270. Type-species : *Asilus gibbosus* Linnaeus, by designation of Latreille, 1810.

Although nearly thirty species of *Laphria* have been recorded from the Ethiopian Region (Hull, 1962 : 323) this genus is not well represented in collections, either from the equatorial forest or from the savannah areas. The flies are among the most conspicuous of Asilidae, and easily attract the attention of collectors. To some extent their apparent scarcity may be a reflection of their feeding habits, which may take them in pursuit of wasps and bees high up in the trees.

The genus *Laphria* shares with *Storthyngomerus* and *Dasyllina* a characteristic type of proboscis, laterally flattened, with an acute edge both dorsally and ventrally, like a paper-knife. Presumably this has some relation to the nature of the prey, though its significance is not obvious : other Laphriine robber-flies, notably the genera *Proagonistes* and *Hyperechia*, will attack big Hymenoptera, but these have a proboscis of quite a different shape.

No species of *Laphria* is among the material that I have received from the Parc National du Garamba, but I have seen a number of species from other localities in and around the Congo Basin. It seemed useful, therefore, to give details of these, and to present a key that includes as many as possible of the species of *Laphria* recorded from the Ethiopian Region.

KEY TO THE SPECIES OF *LAPHRIA* OF THE ETHIOPIAN REGION

1 Scutellum and at least posterior part of mesonotum conspicuously covered with dense, recumbent, yellow hairs, which conceal ground colour 2
– Scutellum bare, or with scattered fine hairs only, not obscuring ground colour . 6
2 Legs distinctly patterned, or entirely red 3
– Legs either entirely black, or indistinctly reddish at extreme base 4
3 Mesonotum entirely obscured by dense orange hairs, paler posteriorly ***bella*** Loew, 1857 : 356
– Mesonotum mostly dull brown, with outline pattern only ***lateralis*** Fabr., 1805 : 157 (***bequaerti*** Bromley), 1947 : 409

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[2] See under *Smeryngolaphria pallida*.

4 A rather small species (14 mm). Basal half of wings distinctly hyaline. Moustache mainly black . ***aureopilosa*** Ricardo, 1901 : 171 (***variabilis*** Bromley), 1935 : 112
– Larger species, wings paler only at extreme base. Moustache partly yellow . . 5
5 All segments of abdomen densely covered with bright orange hairs, which obscure the ground colour . . . . ***auricorpus*** Hobby, 1948 : 140
– Only first four segments of abdomen with golden hairs, which are sparse on disc and do not obscure ground colour ; last three segments blackish with short black hairs ***aurifer*** Ricardo, 1925 : 280 (p. 228)
6 Legs distinctly patterned in black and red, or entirely red or yellow . . . 7
– Legs entirely black, or with indistinct reddish joints only 15
7 Hairs of moustache mainly golden 8
– Hairs of moustache black, though there may be a tuft of yellow hairs at each side 9
8 Marginal bristles as well as short hairs of scutellum yellow ***lateralis*** Fabr., 1805 : 157 (***bequaerti*** Bromley, 1935 : 409)
– Marginal bristles and short hairs of scutellum black, or with only isolated yellow ones ***contristans*** Hobby, 1948 : 139 (p. 228)
9 Moustache with some orange hairs or bristles as well as black ones . . . 10
– Moustache without orange hairs ; with black bristles and white hairs, or entirely black 12
10 Mesonotum bare, shining blue-black. Hind femora entirely orange. Smaller species (15 mm) . . . . ***ctenoventris*** sp. n. (p. 228)
– Mesonotum dulled with blackish or brownish tomentum. Hind femora not entirely orange. Larger species (20–25 mm) 11
11 Hind femora entirely black. Occiput with grey tomentum as well as black hairs. Abdomen black with black hairs . . . . . . ***hera*** Bromley, 1935 : 408
– Hind femora with basal half red, apical half black. Occiput with black hairs but no grey tomentum. Abdomen black with orange hairs at tip ***maynei*** Janssens 1953 : 207 (p.230)
12 Abdomen reddish brown, first segment mostly obscure dark brown, median areas of tergites with an obscure blackish brown stripe . ***schoutedeni*** Bromley, 1935 : 408
– Abdomen black 13
13 Dorsum of thorax and scutellum black with scattered golden hairs ***iola*** Bromley, 1935 : 409 (p. 230)
– Dorsum of thorax and scutellum black, with short black hairs 14
14 Femora bright orange, rather swollen, only extreme base and an apical ring of variable breadth are black. Thorax and abdomen smooth and shining metallic blue ; black hairs not arising from obvious pits . ***flavipes*** Wiedemann, 1821 : 208
– Fore and middle femore entirely black, slender . . . . sp. n.
15 First three abdominal segments red, rest black ; abdomen rather club-shaped ***carbonaria*** Ricardo, 1925 : 282 (***consistens*** Bromley, 1935 : 405) (p. 228)
– Abdomen entirely black, or metallic blue-black 17
16 Large black or metallic blue-black species, well over 20 mm long 16
– Length 10–20 mm 19
17 Abdomen entirely black 18
– Segments 2, 3 of abdomen each with a broad white band, half as long as segment, narrowed or interrupted in middle. Wings pale at base ***luctuosa*** Macquart, 1847 : 37
18 Wings entirely black-brown. Metapleural bristles (just before halteres) entirely black . . . . ***bipenicillata*** Bigot, 1891 : 370 (? ***metalli*** Walker, 1851 : 108)
– Wings black-brown, but clear at base. Upper metapleural bristles black, lower ones white . . . . ***serpentina*** Bezzi, 1908 : 378
19 Mesonotum and scutellum black, with thin, sparse covering of yellow hairs ***nigrescens*** Ricardo, 1925 : 279 (? ***fortipes*** Walker), 1857 : 128
– Mesonotum and scutellum may have tomentum but no yellow hairs, except possibly on scutellar margin 20

20 Abdomen entirely black . . . . **nigribimba** Bromley, 1935 : 406 (p. 230)
– Abdomen black, with a pattern of grey tomentum **ricardoi** Bromley, 1935 : 407 (p. 230)

Laphria aurifer Ricardo

(Text-fig. 3)

Laphria aurifer Ricardo, 1925 : 280.

LULUA : Kapanga, 1 ♂, 1 ♀, x.1933 (*F. G. Overlaet*) ; MAYUMBE : Lundu, 1 ♂, 24.i.1925 (*A. Collart*) ; HAUT-UELE : Yebo Moto, 1 ♂, xii.1926 (*A. Corbisier*) (MRAC).

Laphria carbonaria Ricardo

Laphria carbonaria Ricardo, 1925 : 282.
Laphria consistens Bromley, 1935 : 405.

LUKUGA : Bena Bendi, 1 ♂ v. 1915 (*R. Mayné*) ; KIBALI : Watsa à Niangara, 1 ♂, vii.1920 (*L. Burgeon*) ; UELE : Bambesa, 1 ♂, 20.ix.1933 (*H. J. Brédo*) ; Bambesa, 1 ♀, 20.x.1953 (*J. Leroy*) ; STANLEYVILLE : Yangambi, 1 ♀, 1940, I.N.E.A.C. (MRAC).

Laphria contristans Hobby

(Text-figs 4–6)

Laphria contristans Hobby, 1948 : 139.

UELE : Bambesa, 1 ♂, 1 ♀, 10.ix.1937 (*J. Vrydagh*) ; Bambesa, 10 ♂, 2 ♀, ix.–x.1933 (*H. J. Brédo*) ; Bambesa, 5 ♂, 3 ♀, x.1933 (*J. Leroy*) ; 2 ♀, 14.v.1933 (*P. Henrard*) ; Bambesa, 1 ♂, 10.ix.1937 (*J. Vrydagh*) ; 1 ♂, vi.1937 ; 1 ♂, 10.1939 ; terr. Wamba, Bayenge, 1 ♀, 12/22.viii.1956 (*R. Castenau*) ; Binza, 1 ♂, 1954 (*A. Bosma*) ; COQUILHATVILLE : Eala, 1 ♀, i.1936, 1 ♂, 1 ♀, x.1936 (*J. Ghesquière*) ; GABON : Libreville, 1 ♀, xi.1913 (*Don G. Babault*) (MRAC).

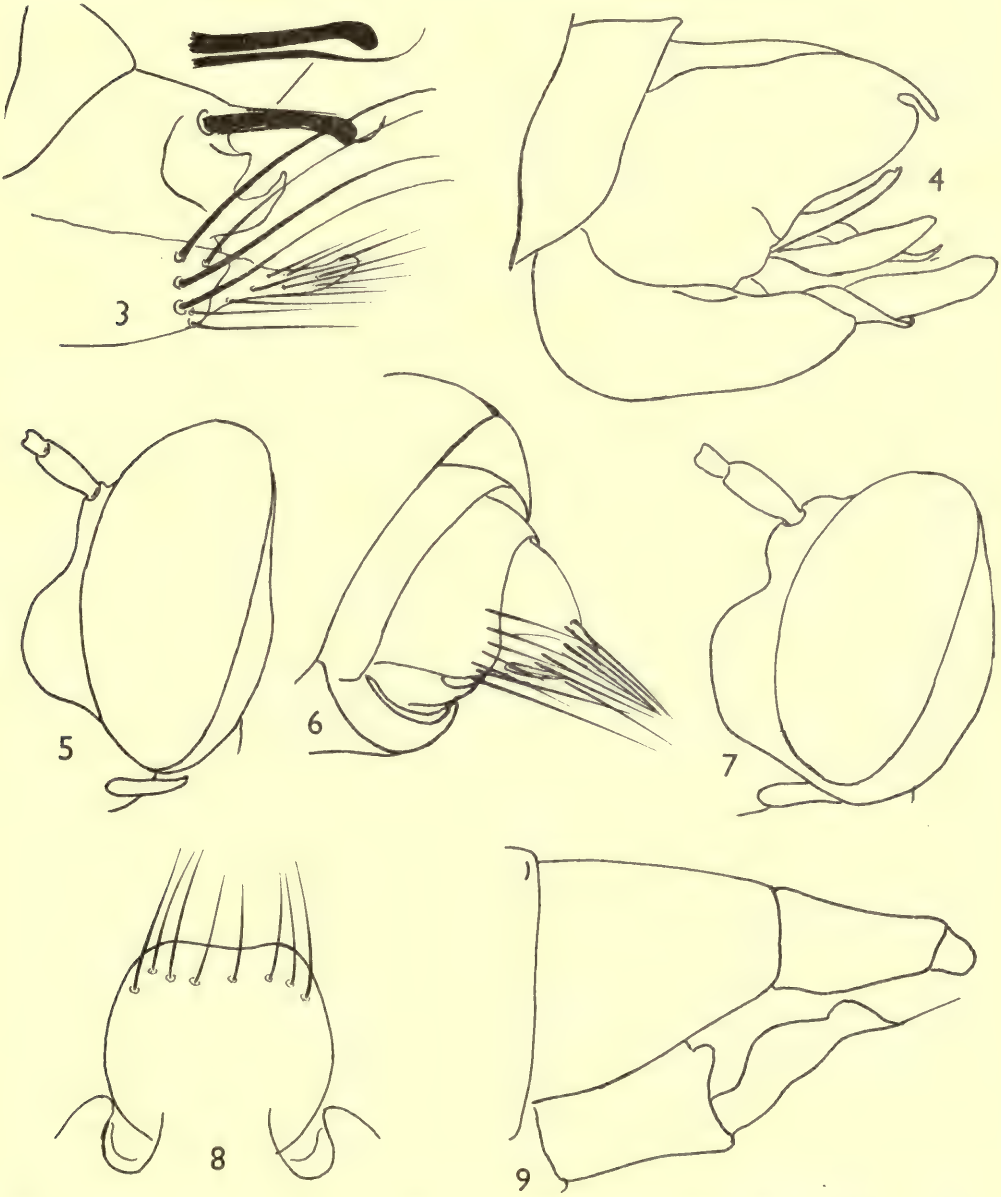
Laphria ctenoventris sp. n.

Allied to *maynei* Janssens and *hera* Bromley, but distinguished from both by having the mesonotum and scutellum bare, shining blue-black, except for small areas of brown tomentum at extreme sides. Hind femora typically entirely orange, though experience in other species of *Laphria* suggests that some variation in leg-colour is likely.

♀ *Head*. Black. Frons with black hairs and bristles ; face with yellowish tomentum and long, yellow hairs below antennae and at sides, but with moustache principally black ; about three stout orange bristles ventrally on each side of moustache. Antennae black, hairs mixed orange and black. Palpi and proboscis black with orange hairs. Beard orange, but post-ocular and occipital hairs and bristles black.

Thorax. Mesonotum and scutellum bare, shining, blue-black ; brown tomentum only around humeri and postalar calli, and before base of scutellum ; covered with short, black hairs and with black bristles ; a number of weak humerals, one strong and one weak supra-alars, three or four strong postalars, and six strong marginal scutellars : of the dorsocentrals only a weak pair of prescutellars. Pleura covered with rather thin, brassy yellow tomentum ; hairs mostly orange. Metapleural tuft mainly black.

Abdomen. Dorsum like thorax, shining blue-black, with short black hairs, and only a narrow



FIGS 3–9. *Laphria* spp. 3, *L. aurifer*, ♂ genitalia. 4, *L. contristans*, ♂ genitalia. 5, *L. contristans*, head. 6, *L. contristans*, ♀ genitalia. 7, *L. maynei*, head. 8, *L. nigribimba*, ♀ VIII sternite. 9, *L. nigribimba*, ♀ genitalia.

band of brown tomentum at base of each segment. Venter similar, but with dull yellow-brown band on hind margin of each segment.

Legs. Coxae and trochanters black. Rest of legs entirely bright orange, including all tarsal segments, pulvilli, and bases of claws ; only apical three-quarters of claws black.

Wings. Almost uniformly smoky brown, indistinctly lighter towards base. Halteres yellow, knob not darkened.

Length of body 15 mm ; of wing 12 mm.

Holotype ♀. Lulua : Kapanga, x.1932 (*F. G. Overlaet*) (MRAC).

Paratypes. Coquilhatville : Lukolela, 1 ♀, 21.xii.1920 (*H. Schouteden*) ; ' Congo Belge ', 1 ♀ (*Don Gilson*) (MRAC).

1 ♀, Bomba (*A. Henrion*) differs in having yellow hairs on mesonotum and ventrally on abdomen.

Laphria iola Bromley

Laphria iola Bromley, 1935 : 409

Lomami : Lusuku, 1 ♀, xii.1930 (*P. Quarré*) ; Lulua : Kapanga, 1 ♀, x–ii.1931/2 (*G. F. Overlaet*) (MRAC).

Laphria maynei Janssens

Laphria maynei Janssens, 1953 : 207.

Holotype ♀. Stanleyville : Yangambi, 6.vi.1952 (*R. Mayné*) (IRSNB).

Uele : Bambesa, 1 ♀, 9.v.1938 (*P. Henrard*) ; Sankuru : Kondue, 1 ♂, 1 ♀ (*Ed. Luja*) ; Lulua : Kapanga, Itonde, 1 ♂, ix.1932 (*G. F. Overlaet*) ; Leopoldville : Lukolela, 1 ♀, xi.1934 (*Dr Ledoux*) (MRAC).

The hitherto undescribed male of this species closely resembles the female. It is somewhat larger and has the hairs of the legs much longer, especially on ventral surfaces of femora and tibiae.

Laphria nigribimba Bromley

(Text-figs 8–9)

Laphria nigribimba Bromley, 1935 : 406.

Uele : Bambesa, 2 ♀, 15.ix.1933 (*H. J. Brédo*) ; Bambesa, 1 ♀, 15.ix.1933 (*J. V. Levy*) ; Stanleyville : Basoko, Yacharo, 1 ♀, iv.1949 (*P. L. G. Benoit*) ; Ubangi : Binga, 1 ♀, 5/12.iii.1932 (*H. J. Brédo*) ; Lulua : Kasai, 1 ♀, 1928 (*Dr. Walker*) ; Coquilhatville : Flandria, 1 ♂, iii.1932 (*R. P. Hulstaert*) ; Eala, 1 ♂, 2 ♀, 1932 (*A. Corbisier*) ; Kundelungu : riv. Kalumbulwa, 1 ♀, 22.10.1951 (*G. Marlier*) ; Tshuapa : Bokuma, 1 ♀, 1953 (*R. P. Lootens*) (MRAC).

Laphria ricardoi Bromley

Laphria ricardoi Bromley, 1935 : 407.

Coquilhatville : Eala, 1 ♀, vi.1932 (*A. Corbisier*) ; Mayumbe : Zobe, 1 ♂, 1 ♀, i.1916 (*R. Mayné*) ; Ubangi : Libenge, 1 ♀, i.1927 (*Leontovitch*) ; Tanganika :

Kamens, 1400 m, riv. Kinga, 1 ♂, i.1953 (*H. Bomans*) ; LEOPOLDVILLE : Thysville 1 ♀ (*Dt. Houssiaux*) (MRAC).

DASYLLINA Bromley

Dassylina Bromley, 1935 : 412 [*lapsus* for *Dasyllina*]. Type-species : *Dasyllina fulvithorax* Bromley, loc. cit.

The original diagnosis of this genus makes it clear that the name indicates its general resemblance to the American genus *Dasyllis*, and therefore the spelling *Dassylina* is incorrect.

Dasyllina fulvithorax Bromley

Dasyllina fulvithorax Bromley, 1935 : 413.

BAS-CONGO : Kimwenza, 1 ♂, i-iv.1956 (*R. P. Van Eyen*) (MRAC).

STORTHYNGOMERUS Hermann

Storthyngomerus Hermann, 1919 : 357, note ; Engel, 1924 : 106 ; Lindner, 1955 : 35, fig. 3. Type-species : *Dasypogon tridentatus* Fabricus, by original designation.

Nusina Curran, 1927 : 7 ; Bromley, 1935 : 411. Type-species : *Laphria dymes* Walker, by original designation.

Each of these two genera was described in a brief note, indicating the type-species, but saying little about the limits of the genus, or of its affinities. The interpretation that I have put upon *Storthyngomerus* is that given by Lindner (1955).

The type-specimen of *Laphria dymes* Walker is in the BMNH, so that *Nusina* can be defined precisely. There can be no doubt that *N. dymes* is conspecific with *Storthyngomerus tridentatus* (Fabr.), and that only females have so far been assigned to these. On the other hand, *Nusina aurea* Bromley is known only from males, and it seems clear from material in the BMNH that most of these are also conspecific with *dymes* and *tridentatus*. Confusion is caused by the sexual dimorphism of the legs, the femora being all orange in the females and heavily darkened in the males. One male in the BMNH, with legs entirely orange like the females, has distinctive genitalia and is clearly specifically distinct.

The fact that the orange-legged females are conspecific with the dark-legged males and not with the orange-legged male is supported by the other characters mentioned in the key below.

Laphria testacea Macquart was transferred to the genus *Storthyngomerus* by Engel (1924), who did not give any reason for doing so, and it is difficult to understand why. The description of *testacea* Macquart agrees quite well with specimens of *Trichardis testacea* Hermann (q.v.), whereas the statement that the antennae are ' assez courtes ' does not suggest *Storthyngomerus*.

Lindner (1955) described *Storthyngomerus minor*, a very much smaller, black species, which seems incongruous with the much bigger typical species. Yet it shares the generic characters of *Storthyngomerus* which, besides the elongate antennae, include the absence of scutellar bristles and the presence of spiny tubercles beneath the hind femora, somewhat like those of *Trichardis* (q.v.).

KEY TO THE SPECIES OF *STORTHYNGOMERUS*

1 Tiny species not more than 7 mm long. *First* antennal segment elongate, about as long as height of face. Facial knob small . . . **minor** Lindner (Kenya) (p. 234)

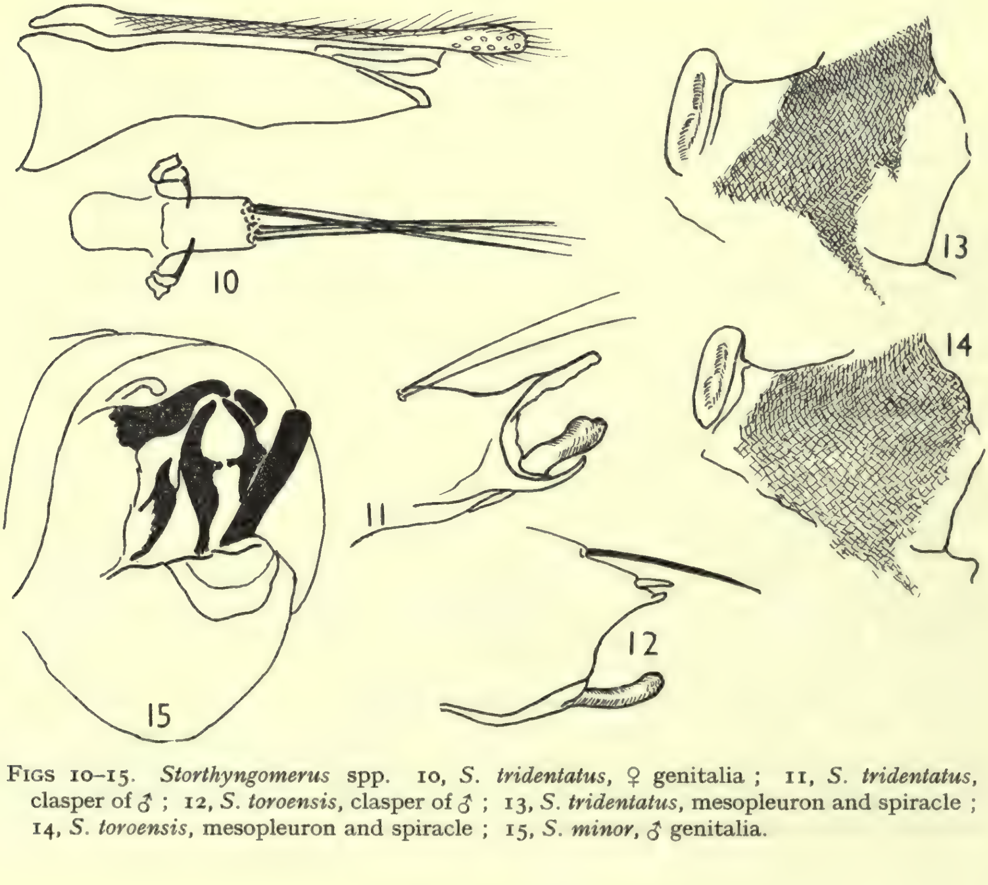
– Much longer specimens, 11–15 mm long. *First* antennal segment much shorter, only twice as long as second, and much shorter than height of face. Facial knob short but strongly prominent 2

2 Proboscis slightly longer than height of head. Mesopleuron with well-marked anterior border of white tomentum (Text-fig. 13). Femora orange in females, but with broad black bands in males, at least on mid and hind femora. Genitalia of male as in Text-fig. 11 ; lower forceps curled round tip of clasper, and without a small apical spine, but with two long bristles . . . **tridentatus** Fabricius (p. 232)

– Proboscis no more than three-quarters height of head. Mesopleuron with anterior pale margin inconspicuous or absent (Text-fig. 14). Femora orange in males. Genitalia of male as in Text-fig. 2 ; lower forceps not curled round tip of clasper, and with a small apical spine but only one long bristle . **toroensis** sp. n. (p. 233)

Storthyngomerus tridentatus (Fabricius)

(Text-figs 10, 11, 13)



FIGS 10–15. *Storthyngomerus* spp. 10, *S. tridentatus*, ♀ genitalia ; 11, *S. tridentatus*, clasper of ♂ ; 12, *S. toroensis*, clasper of ♂ ; 13, *S. tridentatus*, mesopleuron and spiracle ; 14, *S. toroensis*, mesopleuron and spiracle ; 15, *S. minor*, ♂ genitalia.

Dasypogon tridentatus Fabricius, 1805 : 167
Laphria dymes Walker, 1849 : 377.
Nusina aurea Bromley, 1935 : 411.

GARAMBA NATIONAL PARK : 1949–52, 1 ♀ (no detailed locality or number) (IPNC). KATANGA : Elisabethville, 1 ♀, 30.ix.1926 (*Dr. M. Bequaert*) ; SANKURU : Komi, 2 ♀, v.xii.1930 (*J. Ghesquière*) ; STANLEYVILLE : Stanleyville, 1 ♀, 13/23.viii.1928 (*A. Collart*) ; COQUILHATVILLE : Eala, 1 ♀, viii.35 (*J. Ghesquière*) ; Eala, 1 ♂, iv.1933 (*A. Corbisier*) ; BAS-CONGO : Lemfu, 1 ♀, vi.1945 (*Rév. L. De Beir*) ; TSUAPA : Ikela, 1 ♀, 1955 (*R. P. Lootens*) ; KWANGO : Mwilambongo, 1 ♀, ix.1949 (*Vanden Borght*) ; UELE : Bambesa, 1 ♂, 10.viii.1937 (*J. Vridagh*) (MRAC).

Storthyngomerus toroensis **sp. n.**

(Text-figs 12, 14)

The solitary known male of this species is superficially very similar to males of *S. tridentatus*, but differs in having the legs entirely orange ; in *S. tridentatus* the *females* have orange legs, but the males have at least the middle and hind femora with broad black bands. The proboscis is distinctly shorter than in *tridentatus*, being only three-quarters as long as the height of the head instead of rather longer than this distance. In corroboration there are very clear differences in the male genitalia. (Text-figs 12, 14.)

♂ *Head*. Facial knob prominent, occupying lower half of face and separated by a distinct hollow from the prominent tubercle on which the antennae stand. First antennal segment twice as long as second (third segment broken off). General colour of head black. Frons, vertex and upper occiput bare, shining black, with sparse black bristles. Face with yellowish grey tomentum except for a bare patch on facial knob. Hairs yellow, more scaly on middle of eye-margins. Stronger bristles of moustache black. Proboscis and palpi black : palpi with black hairs, base of proboscis with longer white hairs. Behind the eyes a broad strip of yellowish white tomentum, with black bristles on dorsal two-thirds, fine yellow hairs ventrally.

Thorax. Pronotum black with about eight strong black bristles. Mesonotum and scutellum black, uniformly covered with short, fine, black, bristly hairs and short, golden, silky hairs. Humeri with some longer black hairs, and prehumeral hollows with white tomentum ; one notopleural and one supra-alar black bristle ; no long marginal scutellars. Pleura black, covered with white tomentum except for mesopleuron, which has a large, bare, shining black area almost reaching to anterior margin, and so with the anterior white margin much less obvious than in *S. tridentatus* ; one black mesopleural bristle. Metapleural tuft before halteres black, bristles strong and dense.

Abdomen. Dorsum with reduced first segment and entire second segment black, with short black hairs ; second segment laterally with yellow hairs and a tuft of two or three strong orange bristles. Rest of abdomen, including genitalia, orange, with yellow or pale yellow hairs. Genitalia as in Text-fig. 12, distinct from those of ♂ *tridentatus* in having lower forceps flattened and acutely tipped, with one long bristle and a short, subapical spine. No dorsal process curving round clasper. (Genitalia rotated through 180.°)

Legs. Trochanters black ; rest of legs entirely orange, with nearly all hairs and bristles yellow, except for a few on tarsi and a large patch of black dorsally on femora (*S. tridentatus* ♂ has yellow hairs even over the black femoral patches).

Wings. Infuscation—both staining and microtrichiae—almost uniform all over, without clearer centres in basal, anal and axillary cells. Halteres orange.

Length of body 15 mm ; of wing 13 mm.

Holotype ♂. UGANDA : Southern Toro, Mbarara, Fort Portal Road, 3,800–4,200 ft, 22–24.x.1911 (*S. A. Neave*) (BMNH).

Storthyngomerus minor Lindner

(Text-fig. 15)

Storthyngomerus minor Lindner, 1955: 35

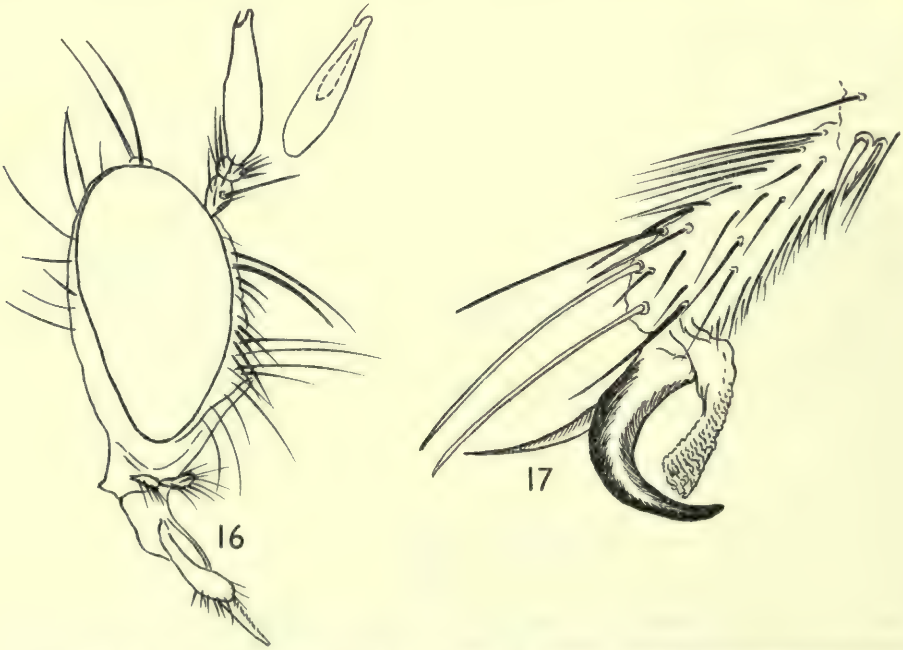
Holotype ♀. TANGANYIKA : Dar-es-Salaam, xi.–xii.1951 (*E. Lindner*) (SMNS). KENYA : Diani Beach, vii.51 (*N. L. H. Krauss*) (BMNH).

SMERYNGOLAPHRIA Hermann

Smeryngolaphria Hermann, 1912 : 226 ; Bromley, 1935 : 410 ; Hull, 1962 : 331. Type-species : *Laphria melanura* Wiedemann, 1828, by original designation.

Smeryngolaphria is a small and rather ill-defined genus from South and Central America. Bromley (1935) considered that it should be extended to include the Oriental species for which Hermann had erected the genera *Anisosis* and *Orthogonis* ; and the BMNH collection contains a number of red-and-black Laphriine species that were placed in *Smeryngolaphria* by Miss Ricardo.

Bromley also described *Smeryngolaphria pallida* from a single male from the eastern Congo. A second specimen from the same area is before me, and there is no doubt that it belongs to *pallida* Bromley. The generic assignment is less certain.



FIGS 16, 17. *Smeryngolaphria pallida*. 16, head ; 17, tarsus and claw.

According to Hull (1962), and to specimens in the BMNH, it seems at least equally likely that it should be placed in the genus *Cenochromyia* Hermann (1912 : 115), another genus of yellow or reddish Laphriine flies from New Guinea and adjacent areas. It will not run to *Smeryngolaphria* in my key to African genera (Oldroyd, 1963 : 11) because the metanotal slopes are hairy. In Hull's interpretation these slopes should be bare in *Smeryngolaphria*, though Bromley considered that they might be either hairy or bare. Bromley specifically mentions that they are hairy in his species *pallida*.

A clear decision about the genus of this fly cannot be made in isolation, and will have to await a more general study of the Laphriini.

Smeryngolaphria pallida Bromley

Smeryngolaphria pallida Bromley, 1935 : 410.

Holotype ♂. KIVU : Walikale, 1.i.1915 (*J. Bequaert*) (MCZH). W. KIVU : Lubongola, pr. Shabunda, 1 ♀, 1939 (*Dr. Hautman*) (MRAC).

LAXENECERA Macquart

Laxenecera Macquart, 1838 : 77 ; Hermann, 1919 : 337–358. Type-species : *Laxenecera albibarbis* Macquart (an Indian species), by designation of Hermann, 1919, loc. cit.
Acurana Walker, 1851 : 107. Type-species : *Acurana sexfasciata* Walker, monotypic.
Dyseris Loew, 1857 : 357 ; 1860 : 122. Type-species : *Laxenecera andrenoides* Macquart, by designation of Loew, 1860 : 122.

Laxenecera is most easily recognized by the fairly long, narrow third antennal segment, which bears a distinct fringe of hairs dorsally as well as ventrally. Macquart says that the name expresses the hairiness of the antennae. Unfortunately the antennae of Asilidae are prominent, and are easily destroyed in dried specimens, and then it is necessary to rely upon a combination of other characters. Moreover, dorsal hairs on this antennal segment also occur in some *Hoplistomerus* and *Trichardis*.

Laxenecera has the proboscis triangular in cross-section, the palpi very slightly clubbed at the tip, and usually the hind femora swollen with the hind tibiae correspondingly curved. Many of the species look like small bees.

There is one widespread, common, and variable species (*albicincta* Loew), and a number that are more locally distributed. There is considerable variation between individuals, and this is one of the most difficult genera to present in the form of a key to species. The male genitalia can be examined to some extent without dissection, and show some differences between species, but I have not found these much use in identification. A confusing factor is the very great sexual dimorphism that is generally present : e.g. in *albicincta* the male is a slender black fly, with white hairs and no abdominal bands ; the female is a stout fly with rusty yellow hairs and bristles, and conspicuous bands on the abdomen. The leg-pattern is the most reliable way of associating males and females, but individual variation must be allowed for.

The two species originally included by Macquart were from India, but as we know it today the genus is predominantly an African one. Loew erected the genus *Dyseris* for some of the African species as a result of an error in the numbering of a Plate in one of Macquart's works ; the error was pointed out by Hermann (1919).

KEY TO THE SPECIES OF *LAXENECERA* OF THE CONGO BASIN

1 Mesonotum with distinct long bristles, prominent in contrast with the much shorter clothing hairs. Sides of abdominal tergites usually with strong bristles . . . 2

– Mesonotum either furry, with bristles hidden among long, soft hairs, or else with very short clothing hairs and almost no long bristles. Sides of abdomen usually without strong bristles 15

2 Legs partly orange or yellow, with extensive paler areas on tibiae or femora. . 3

– Legs almost entirely black, no more than faintly reddish on tibiae and at base of hind femora 8

3 Femora black, except perhaps for base and tip of hind femora 4

– Femora extensively orange, especially hind femora 7

4 Abdomen clothed uniformly with yellow hairs, or with a few white ones at sides, but no obvious posterior bands on abdominal segments . ♀ ***auricomata*** Hermann (p. 238)

– Abdomen with obvious posterior bands on each segment 5

5 First three abdominal segments with broad posterior bands of dense whitish hairs; other segments contrasting, almost black . . ♂ ***abdominalis*** sp. n. (p. 238)

– All abdominal segments with posterior bands of pale tomentum and hairs . . 6

6 Only tarsi and dorsal surfaces of tibiae orange. Occipital hairs generally including a black tuft. Wings lightly but uniformly smoky. ♂ hind femora and tibiae without conspicuous black ventral fringe ***rufitarsis*** Bezzi (***funditor*** Curran) (p. 239)

– Fore and middle tibiae mainly orange. Occipital hairs generally entirely yellowish. Wings strongly infuscated along veins. ♂ hind femora and tibiae swollen, and with a conspicuous fringe of black hairs ventrally . . ***misema*** sp. n. (p. 239)

7 Hind femora red at base, black apically, divided transversely ***pulchella*** sp. n. (p. 239)

– Hind femora with red and black horizontal stripes
albicincta Loew, undescribed form

8 Abdominal segments with a well-defined band of tomentum on posterior margin . 9

– Abdominal segments without a posterior band of tomentum, or with one at sides only 13

9 Scutellum with black hairs on disc, though marginals may be pale. Wings dark brown (♂). Middle legs with black hairs ventrally, white hairs dorsally (♂)
dimidiata Curran (p. 240)

– Scutellum with pale hairs and bristles. Wings pale 10

10 Hind femora and tibiae with conspicuously strong bristles, especially antero-apically 11

– Hind femora and tibiae with long, fine hairs and bristles, but not conspicuously strong ones 12

11 Abdomen with dense golden tomentum on posterior bands, and almost entirely covering first two or three segments . . . . . ***francoisi*** sp. n. (p. 240)

– Abdomen with ashy grey tomentum on posterior margins, otherwise black-brown
♀ ***albicincta*** Loew (p. 241)

12 Mesonotum with short, recumbent, golden hairs, almost lost in a mass of very long, fine hairs, giving a bee-like appearance. Hind tibiae with a brush of long black hairs ventrally . . . . ***chrysonema*** sp. n. (p. 242)

– Mesonotum with recumbent golden hairs, but almost no long hairs or bristles. Whole insect bare and rather deficient in long hairs and bristles ***sororcula*** Karsch

13 Short, recumbent hairs of abdomen yellow, as are lateral bristles. Hairs of head and legs predominantly yellow . . . . . . ♂ ***auricomata*** Hermann

– Short, recumbent hairs of abdomen almost entirely black, except on small lateral grey triangles ; lateral bristles of abdomen black. Hairs of head and legs in black or white clumps 14

14 Pale hairs of head and thorax silvery white. Moustache predominantly black ♂ ***albicincta*** Loew

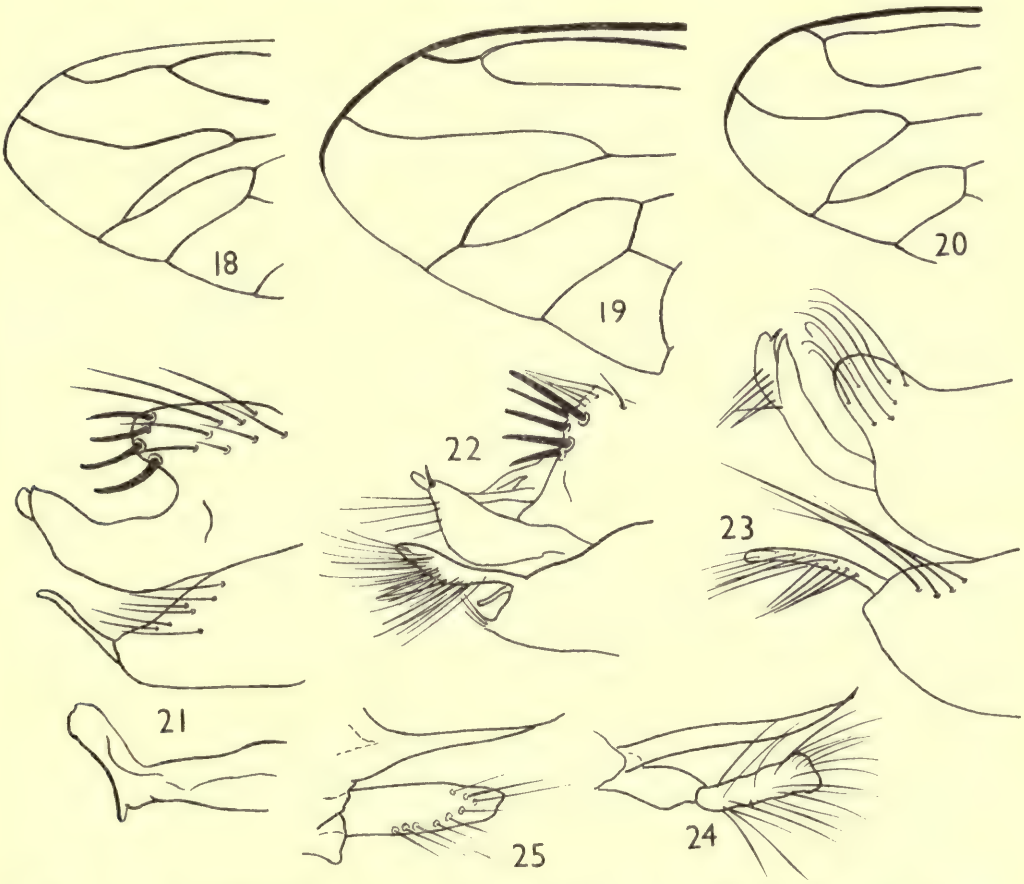
– Pale hairs of head and thorax yellowish. Lower half of moustache yellowish (♂), or moustache entirely pale (♀) . ♂ ♀ ***albicincta*** Loew form ***stuhlmanni*** Röder

15 Abdominal segments without posterior bands, uniformly covered with yellow or whitish hairs . . . . ♀ ***auricomata*** Hermann

– Abdominal segments showing distinct posterior bands or lateral triangles . . 16

16 Mesonotum very bare, with a covering of recumbent black hairs mixed with scaly golden ones, and with a very few long bristles, unusually slender. Mesopleuron with a broad bare stripe reaching to dorsal margin . . . ***gymna*** sp. n. (p. 242)

– Mesonotum furry, bee-like flies. 17



FIGS 18–25. *Laxenecera* spp. 18, *L. mollis*, wing ; 19, *L. andrenoides*, wing ; 20, *L. engeli*, wing ; 21, *L. albicincta*, ♂ genitalia ; 22, *L. andrenoides*, ♂ genitalia ; 23, *L. auricomata*, ♂ genitalia ; 24, *L. albicincta*, maxilla and 2-segmented palpi ; 25, *Ctenota mollitrix*, maxilla and 1-segmented palp.

17 Hairs of mesonotum (though not of pleura) entirely black in ♂, partly grey in ♀. Scutellum shining black with yellow tomentum at base, and hairs entirely black **chapini** Curran (p. 243)

– Hairs of mesonotum entirely yellowish, or with a few black hairs only. Scutellum with long yellow hairs 18

18 Moustache, both male and female, with black hairs in lower part. Mesopleuron mostly tomented, with only a small bare black area **nigrociliata** Hermann (p. 243)

– Moustache either yellow (♂) or pale yellowish (♀), but without an obvious black tuft. Mesopleuron shining black for about half its area, tomented on dorsal and posterior margins . . . . { **dasypoda** Speiser / **scopifera** Speiser }

Laxenecera auricomata Hermann

(Text-fig. 23)

Laxenecera auricomata Hermann, 1919 : 351.

KIVU : Tshibinda, 3 ♂, 1 ♀, xii.1927 (*Ch. Seydel*) ; Muhunga, Tshibinda, 1 ♂, xi.1951 ; ITURI : Luburo, 1 ♂, 1958 (*Mme van Riel*) ; HAUT-UELE : Yebo Moto, 1 ♀, 1926 (*L. Burgeon*) (MRAC). Also found in UGANDA.

Laxenecera abdominalis sp. n.

The male is distinguished from all other *Laxenecera* known to me by having the first three abdominal segments mainly or entirely covered with whitish hairs, while the rest of the abdomen has the hairs almost exclusively black.

♂ *Head.* Clothed with golden hairs, except for a black tuft on each side of frons, close to antennae, and a black tuft in middle of occipital margin. First antennal segment with yellow hairs, other two with black hairs.

Thorax black. Ground colour of mesonotum and scutellum almost obscured by short, recumbent, whitish or yellowish hairs. Bristles longer, fine and hair-like, black on disc of mesonotum, whitish laterally and posteriorly, and on margin of scutellum. Pleura mostly obscured by brownish tomentum. Mesopleuron shining black, with a vertical posterior band of yellowish tomentum, and some black some yellow bristles.

Abdomen black, obscured by short, recumbent yellow hairs. On first segment and a broad posterior band on second and third, these are silky white, but on anterior half of second and third segments, and almost entirely on other segments, they are black. Venter black-brown with mainly yellowish hairs.

Legs mainly black, but tibiae and tarsi of fore and middle legs are extensively orange, with numerous yellow hairs and bristles. Hind femora black, with mainly black hairs, but with a few white ones dorso-apically, hind tibiae with dense and moderately long white hairs dorsally and ventrally ; hind tarsi with black hairs ventrally and a conspicuous fringe of dense silvery ones dorsally.

Wings rather smoky towards tip, no special features.

Length of body 14 mm ; of wing 10 mm.

Holotype ♂. TANGANIKA : Albertville, iii.18–i.19 (MRAC).

Paratypes. Same data, 2 ♂ (MRAC).

Laxenecera rufitarsis Bezzi

Laxenecera rufitarsis Bezzi, 1908 : 377
Laxenecera funditor Curran, 1927 : 8.

URUNDI : Butetsi (Moso), 1 ♂, 27.v.1950 ; Terr. de Rutana, colline Kisikara (Bunyambo), alt. 1,600 m, 1 ♀, 20.vi.1952 ; Bururi, 2,000–2,250 m, 7 ♂, 7 ♀, 9.v.1949 ; Kitaba, 1,850 m, 2 ♂, 10.vi.1949 (FJF).

Laxenecera misema sp. n.

Closely allied to *rufitarsis* Bezzi (*funditor* Curran), from which it is distinguished in the male by the conspicuous fringes of the hind legs. In both sexes it is further distinguished by having the fore and middle tibiae orange, without a black stripe, and by having the occipital bristles all yellow, without a black tuft.

♂ *Head* with some black hairs on second and third segments, and on tips of palpi, otherwise all hairs of head yellow.

Thorax. Mesonotum dull black, with narrow margin of yellowish tomentum at extreme sides, and whitish tomentum anteriorly. Short hairs golden, and closely recumbent, longer hairs and fine bristles mostly golden, but some black ones. Supra-alar and postalar bristles strong, yellowish, postalar callus a little reddish. Pleura, except for the usual bare mesopleural area, with brassy yellow tomentum and yellow hairs and bristles.

Abdomen black, each segment becoming dull reddish towards posterior margin. On hind margin of each is a triangular patch of whitish hairs at each corner, extending towards middle line ; adjacent to these is a band of yellow hairs, which cover whole of first and second tergites, but the others have black hairs over most of disc.

Legs of male with conspicuously swollen hind femora, and stout, bowed hind tibiae, with a brush of black hairs ventrally on apical half of femora and on full length of tibiae. Hind femora black with red apex and base ; tibiae red ; both femora and tibiae obscured by short black hairs. A few strong yellow bristles stand out among black hairs, especially on tibiae. Femora and tibiae both with white hairs posteriorly. Hind tarsi orange, with dense tufts of hair on each segment, silvery white on anterior face, black on posterior face. Fore and middle femora black with red base and tip ; their tibiae and tarsi entirely orange.

Wings greyish, distinctly infuscated along veins.

Length of body 15 mm ; of wing 11 mm.

Holotype ♂. LOMAMI : Luputa (*Bouvier*) (MRAC).

Paratypes. 1 ♂, 1 ♀, same data. One specimen captured from the wasp *Bembex* (MRAC).

Laxenecera pulchella sp. n.

A variable species, recognized by the red antennae, swollen and mainly red hind femora, and in particular by the grey band along the transverse suture of the thorax. This species of north-eastern Africa is included for comparison with *misema*.

Head. Second and third antennal segments dull red, with black hairs ; first segment black, with pale yellowish hairs. Palpi with some black hairs, otherwise hairs of head all pale yellowish, or a little golden towards tips.

Thorax shining black, with a strip of grey tomentum along transverse suture, interrupted in middle. Sides of mesonotum with tomentum, which may be grey, but in some specimens is golden yellow ; silky hairs and bristles may be pale yellowish or deep golden. Pleura evenly covered with grey tomentum and with pale yellowish hairs and bristles.

Abdomen dorsally shining black with black hairs, and with broad posterior bands of grey tomentum with white hairs. Sometimes ground colour under these bands is reddish, especially at sides. In some specimens each segment also has a fore-border of grey tomentum. Strong lateral bristles on anterior segments.

Legs. Fore and middle femora almost entirely black, with only extreme bases and tips yellow ; fore and middle tibiae yellow dorsally, black ventrally, their tarsi orange. Hind femora swollen, red, with a black area of variable extent at tip ; hind tibiae orange-yellow, a little dusky on posterior face ; tarsi red. Hairs of legs white, and bristles pale yellowish, with short black bristles ventrally on hind femora.

Wings uniformly faintly greyish, veins yellow towards base.

Length of body 13 mm ; of wing 10 mm.

Holotype ♂. SOMALILAND : 30 m. S. of Shillawa, 23.ii.53 (*Greathead*) (BMNH).

Paratypes. Same data, 1 ♀ ; KENYA : W. side of Turkwell Valley, 2 ♂, 1.v.54 (*Greathead*) (BMNH).

Laxenecera dimidiata Curran

Laxenecera dimidiata Curran : 7.

ITURI : d'Obougena à Utike (*Collart*) ; Stanleyville area (*Lang & Chapin*) ; KATANGA : Lukagu (*de Witte*) (MRAC).

***Laxenecera francoisi* sp. n.**

In pattern rather like the female of *albicincta*, but distinguished by the more golden yellow colour of the tomentum and by having the abdominal segments liberally covered with yellow hairs, which almost entirely obscure the posterior bands on the first two segments.

Head. Black, with black bristles on 2nd and 3rd antennal segments and on palpi ; otherwise all hairs yellow, or beard indistinctly white.

Thorax black. Mesonotum with thin golden tomentum, leaving a faint indication of a divided median stripe. Hairs yellow, mixed with a few black ones ; long and short hairs not greatly different in length. Scutellum with yellow hairs and numerous long, yellow marginal bristles. Pleura shining black in part, otherwise tomentum, bristles and hairs yellow.

Abdomen dorsally shining black in ground colour, each segment with a broad posterior band of golden tomentum, which extends forwards along side-margins. These yellow bands clothed with golden bristles and hairs. On first two, or perhaps three, tergites the disc of the segment is also covered with brownish yellow tomentum and clothed with golden hairs ; on other segments tomentum more blackish, and there are more black hairs.

Legs mainly black. Fore and middle femora rather indistinctly yellow dorsally ; hind femora red at extreme base. Hairs and bristles all yellowish.

Wings faintly smoky, more yellowish towards base.

Length of body 13–14 mm ; of wing 10 mm.

Holotype ♂. BAS-CONGO : Tshela-Mata, 20.v.58 (*François*) (FJF).

Laxenecera albicincta Loew

(Text-figs 21, 24)

Laxenecera albicincta Loew, 1852 : 659.
Laxenecera apiformis Walker, 1855 : 571.

Laxenecera nigrocuprea Walker, 1855 : 572.
Dyseris zonata Loew, 1857 : 358
Laxenecera stuhlmanni v. Röder, 1893 : 205.
Laxenecera splendida Hermann, 1919 : 341.

The male and female of this species are normally so different that they might be mistaken for quite distinct species. Typically the male is black, with almost entirely black bristles, and no more than a trace of whitish bands laterally on the abdomen. The female is a more bulky insect, with obvious bands of whitish grey or yellowish grey on the abdomen, and with the hairs of the head, thorax and legs predominantly rusty yellowish. In particular the postalar tuft is rusty yellowish, and stands on a tawny callus.

The female has quite a close resemblance to the bee *Megachile felina* Gerst.

The variation in this species is most obvious in the male, where the presence of any white or yellowish hairs is more conspicuous than it is in the female. Hermann (1919) gave it as his opinion that *stuhlmanni* v. Röder was no more than a variety of *albicincta*, distinguished from the typical form by the somewhat differently coloured hairs, especially those of the legs. In Hermann's own variety *splendida* there is less difference between the sexes than in typical *albicincta*, and some males from the Congo Basin have taken on much of the superficial appearance of the females, especially in the rusty yellow postalar bristles, and in the pale moustache. Somewhat similar variation occurs in specimens from the Gold Coast collected by Dr John Bowden. These males seem to have genitalia indistinguishable from those of the typical form.

Laxenecera albicincta is common and widely distributed in eastern and southern Africa, from ETHIOPIA to NATAL and ZULULAND, and round to the mouth of the River Congo. Although it occurs round the fringes of the Congo Basin, and occasionally on the river itself, it is not properly a forest species.

P.N.G., 2332 II/gd/4, 1 ♀, 30.vii.1951 ; 585 I/a/M, 1 ♀, 7.vi.1950 ; 473 Akam, 1 ♀, 3.v.1950 (IPNC).

BAS CONGO : Lemfu, 16 ♂, 12 ♀, i.1915 (*Rév. P. De Beit*) ; Kisantu, 2 ♂, 29–30.xii. 1953 (*P. Basilewsky*) ; RUANDA : Kagera, Gahinga, 1 ♂, 29.iv.1937 (*H. J. Brédo*) ; Rutshuru, 1 ♂, 28.v.36 (*L. Lippens*) ; LUALA : Kapanga, 1 ♂, iv.1932 (*G. F. Overlaet*) : Magidi, 1 ♂, 1942 (*Rév. P. Van Even*) ; de Tenka à Dilolo, Km 109, 1 ♂, iv.1932 (*Dr Ritschard*) (MRAC).

KATANGA : Elisabethville, 1 ♀, 27.iv.1912 (*M. Bequaert*) ; 1 ♀, 1928–29 (*P. Quarré*) ; ITURI : Arac-Aru, 1 ♀, vii.1952 (*M. Winand*) ; Jadotville, Numbi, 2 ♂, 2 ♀, v.1957 (*R. P. Th. de Caters*) (MRAC).

URUNDI : Terr. de Bubanza, Colline Gihanga (Ruzizi), alt. 850 m, 3 ♂, 3 ♀, 6.iii.1952 ; Gihanga, Plane de la Ruzizi, 850 m, 5 ♂, 3 ♀, 9.iii.1932 ; Butetsi (Moso), 1 ♂, 22.v.1950 ; Ruyigi, 1,600 m, 1 ♂, iii.1955 ; Mishiga, 1 ♂, 15.v.1957 ; Terr. de Butana, Colline Ntangusa, Moso, alt. 1,350 m, 1 ♂, 21.vi.1952 ; Kibunbu, 2,100 m, 2 ♀, 25.vi.1950 (FJF).

MOÇAMBIQUE : Chemba, 1931 (*A. Ravet*) (MRAC).

Laxenecera chrysonema sp. n.

A small, black species, with conspicuous golden hairs on all parts of the body, distinguished from *sororcula* Karsch by the way in which the recumbent hairs of the mesonotum are almost hidden in a mass of long, fine hairs.

♂ *Head.* Pubescence long and golden. Antennae have golden hairs, which are mixed with black on second and third segments ; a tuft of black hairs on occipital fringe ; palpi with black hairs.

Thorax black with some greyish tomentum on pleura and sides of mesonotum. Mesonotum with short, recumbent golden hairs, longer towards sides, mixed with very long, erect, fine hairs which are yellow and black. Scutellum with yellow hairs on disc and long yellow marginal bristles. Supra-alar tuft dense, yellow, but above and before wing-base there are several long black bristles. Pleura with yellow hairs.

Abdomen black-brown. Dense yellow hairs form a fringe on sides, and on hind margins of segments. Hairs on disc of each segment sparser, but mainly yellow.

Legs all black, with long yellow hairs and bristles. Venter of each tibiae had black hairs and bristles and there are a few black bristles elsewhere on hind tibiae and tarsi.

Wings faintly and uniformly smoky.

Length of body 10 mm ; of wing 8 mm.

♀ similar but less golden.

Holotype ♂. KATANGA : Lubumbashi, 9.xii.23 (*Seydel*) (MRAC).

Paratypes. KATANGA : Lubumbashi, 1 ♀, 9.xii.23 (*Seydel*) ; Mwema, 2 ♂ (*Bayet*) ; Nyamgwe, 1 ♀ (*R. Mayné*) (MRAC).

Laxenecera gymna sp. n.

A rather elongate and bare, black species, the mesonotum clothed only with very short, recumbent hairs, and almost without strong bristles.

♀ *Head* black with black bristles on occiput, ocellar tubercle and sides of frons. Moustache with black bristles mingled with many white hairs, especially thick laterally. Palpi and proboscis black ; palpi with stiff black bristles and fine whitish hairs. Antennae black, with short but numerous black hairs and bristles ; third segment more than 1½ times as long as first two together.

Thorax black. Mesonotum bare with only small prehumeral patches of grey tomentum ; uniformly covered with short, curly black hairs, interspersed with short, silky yellow hairs. Only supra-alar bristles moderately strong, mixed black and yellow ; other bristles few and very slender, including slender yellow marginal scutellars. Pleura with whitish tomentum, leaving a broad vertical band of shining black which reaches to upper margin of mesopleuron. Metapleural hairs mainly black.

Abdomen shining black, with small triangles of greyish tomentum in posterior angles. Short clothing hairs black, except for a few white or yellow ones on hind margins of segments, and entirely covering sixth and seventh tergites. Venter with grown tomentum and longer yellowish hairs.

Legs black, with yellow hairs and bristles.

Wings uniformly stained brownish. Halteres dark brown.

Length of body 15 mm ; of wing 12 mm.

Holotype ♀. KASAI : Terr. de Dekese, Itunda, x.59 (*F. J. François*) (F.J.F.).

Laxenecera chapini Curran

Laxenecera chapini Curran, 1927 : 9.

P. N. du Garamba : 422 I/a/3, 1 ♀, 17.iv.1950 ; 717 I/a/3 amont. 1 ♀, 24.vii.1950; 895 Napokomweli, 1 ♀, 18.x.1950 ; 1525, II/9f/4, 1 ♀, 10.iv.1951 ; 1576, II/fb/4, 1 ♂, 1 ♀, 19.iv.1951 ; 1726, II/fd/17, 1 ♀, 14.v.1951 ; 1810, II/cf/12, 1 ♀, 23.ii.1951 ; 1915, II/fd/18, 1 ♀, 15.vi.1951 ; 2015, II/ge/6, 1 ♀, 29.vi.1951 ; 2447, II/fd/11, 1 ♀, 18.ix.1951 ; 3429, II/fd/18, 2 ♂, 6.v.1952 ; 4076, Mt Moyo, 1 ♀, 25.ix.1952 (IPNC).

Ituri : Mongbwelu, Kilo, 1 ♂, vii.1938 (*Mme Scheitz*) (MRAC).

Laxenecera nigrociliata Hermann

Laxenecera nigrociliata Hermann, 1919 : 356.

Lomami : Luputa, 1 ♀, i.1935 (*Dr Bouvier*) ; Ruanda : Kibungu, 1 ♂, 1 ♀, x–xii.1937 (*R. Verhulst*) ; Mahamba, 1400 m, terr. Nyanza, 1 ♀, 13/15.i.53 (*P. Basilewsky*) ; Gahiro, 1300 m, terr. Blumba, 1 ♀ (*P. Basilewsky*) ; Urundi : Maleka, 1 ♀, 31.xii.1932 (*L. Burgeon*) ; Kivu : Costermansville, 1 ♂, 1951 (*H. Bomans*) ; Katanga : Lugombo, 1 ♀, xii.1929 (*Ch. Seydel*) ; Elisabethville, 2 ♂, 2 ♀, ii–iv.1938 (*De Loose*) ; Lac Albert, Ishra, 1 ♂, ix.1935, (*H. J. Brédo*) ; Kapanga, 1 ♀, ix.1932 (*F. G. Overlaet*) ; Kibali-Ituri : Djugu, 1 ♂, 13.viii.1931 (*Mme. L. Lebrun*) ; Ituri : Bambili, 1 ♂, 5.xii.1913 (*Dr Rodhain*) ; Bas-Congo : Mahagi, Nirembe, 1 ♂, ix.–x. 1935 (*Ch. Scops*) (MRAC). Urundi : Kisenyi, alt. 1350 m, 1 ♂, 2 ♀, v.1955 ; 4 ♀ iv–v.1957 ; terr. de Muhinga, colline Nyabisudo, (Bugesera), alt. 1200 m, 1 ♀, 3.vi.1952 (FJF).

NUSA Walker

Nusa Walker, 1851 : 105. Type-species : *Nusa aequalis* Walker, by designation of Hermann, 1912 : 239.

Dasythrix Loew, 1851 : 21. Loew, 1860 : 124. Type-species : *Laphria* (*Dasythrix*) *inornata* Loew, by original designation.

Halictosoma Rondani, 1873 : 298. Type-species : *Halictosoma puella* Rondani, monotypic.

Hermann (1912) was misled by the original drawing of *Nusa aequalis* Walker into accepting this as an earlier name for *Andrenosoma* Rondani, but Ricardo (1927) after studying the type in the BMNH, rightly removed *Nusa* into synonymy with *Dasythrix* Loew, 1851, over which it was shown to have three months' priority.

Loew divided his genus *Dasythrix* into two sections, making *inornata*, a South American species, type of the first section, and *infumata*, a South African species, type of the second. Loew gave no distinctions between his two sections, and I have not seen the S. American *inornata*, which clearly must be the type of any restricted genus *Dasythrix*. *Nusa aequalis* Walker is from India, and is congeneric with the African species. Hence, if at a later date it should prove that Loew's two sections are not congeneric with each other, section 1, type *inornata*, would retain the name *Dasythrix*, and section 2 would still be called *Nusa*.

Ricardo (1925 : 278) described '*Nusa africana* ♂, Hermann *in litt.*, sp. n.', and stated that this species was congeneric with *Andrenosoma boranica* Corti from East

Africa, accepting at that time Hermann's view of the synonymy between *Nusa* and *Andrenosoma*. Later (1927 : 206), when she realised the true identity of *Nusa* Walker, Miss Ricardo renamed her species *Andrenosoma africana*, but examination of the series in the BMNH, including the types, shows that even this is incorrect. *Nusa africana* Ric. belongs to the genus *Proagonistes*, and is not congeneric with *boranica* Corti, which is a true *Andrenosoma*.

Nusa, as correctly defined, is distinctive in appearance. The wing-margin is membranous shortly beyond R_4, the first and fourth posterior cells typically closed with a long, or very long stalk, and the veins tending to fade before reaching the wing-margin. The characteristic appearance of flies of this genus is enhanced by the stiff bristles on all parts of the body, including the head.

Species have been recorded in the genus *Dasythrix* from all the zoogeographical regions except the Nearctic, but it is by no means certain that they all belong properly in *Nusa*. Among the African species there is extensive sexual dimorphism, the males tending to be distinctly blacker than the females, and with black hairs everywhere instead of white ones. There is, however, variation in this, and among a complex of specimens there are many males with black moustache and some with the moustache white, though no clear differences can be seen in the genitalia. It seems likely that Loew's three species from the Cape—*infumata* ♂, *brachyptera* ♀ and *stenura* ♂—may be synonyms, but this cannot be determined until types can be examined.

No species of *Nusa* has yet been recorded from the Parc national du Garamba. The genus is unlikely to occur in the forested areas, but may be found in the savanna fringe close to the border with the Sudan. Besides the S. African *infumata*-complex, mentioned above, which extends as far north as the Katanga, there are five other described species from the Ethiopian Region : *nigrapex* Bigot from Natal ; *dispar* Gerstaecker from Zanzibar ; *vittipes* Bezzi from Somaliland ; *ruficornis* Wulp from South Yemen and *albicans* Engel from Rhodesia.

PERASIS Hermann

Perasis Hermann, 1905 : 37 ; Engel, 1924 : 104–5. Type-species : *Perasis sareptana* Hermann, 1905, monotypic.

Saucropogon Hull, 1962 : 103. Type-species : *Perasis transvaalensis* Ricardo, 1925, by original designation.

This genus was clearly defined by Hermann, but has been misinterpreted by Hull (1962 : 93), who removed the S. African *Perasis transvaalensis* Ricardo to be the type of his new genus *Saucropogon* (1962 : 103). Hull saw the type and other specimens of *transvaalensis* in the BMNH, and he also gives drawings of *sareptana* Hermann, though he did not see this species in the BMNH, where it is not represented.

The characters given by Hull (1962 : 103) to define *Saucropogon*, and to differentiate it from *Perasis*, concern mainly the wing-venation and the head-structure, and in fact are the very characters by which Hermann himself defined *Perasis* (1905 : 37). Hermann's fig. 28 shows the venation that Hull says is characteristic of *Saucropogon*. It seems evident that Hull has based his interpretation of *Perasis* on specimens that were not *P. sareptana* Hermann, since, among other things, he says that they have lateral bristles on all the abdominal segments, whereas Hermann's *Perasis* has bristles on the first segment only.

The type material of *transvaalensis* Ricardo agrees with Hermann's definition of *Perasis*, and must therefore revert to that genus. This makes *Saucropogon* Hull, type *transvaalensis* Ricardo, an absolute synonym of *Perasis* Hermann.

The species of *Perasis* are few and poorly known, scattered from Transcaspia across North Africa. Hermann (1920 : 177) gave a list of four names in addition to the type-species : *postica* Becker and *violacea* Becker, both from Algeria ; *Dasypogon maura* Macquart from Oran ; and *Perasis meridionalis* Hermann from the Transvaal. Engel (1925 : 104–5) explained that this last name was a *nomen nudum*, no description having been published, and that it appeared to refer to specimens in Hermann's collection which at the time Engel saw them bore the manuscript name *capensis*. In the same year Ricardo (1925 : 245) described *Perasis transvaalensis* from the Transvaal, and also recorded *meridionalis* Hermann as a *nomen nudum*.

The theory that *Dasypogon maura* Macquart, 1849, is really a *Perasis* appears to come from Hermann (1920 : 177) but he gives no reasons for believing this. Bigot (1878 : 221), in whose collection the type was deposited, thought that it might belong to *Habropogon*.

No *Perasis* is known to me from within the boundaries of the Parc National du Garamba, but the BMNH possesses a specimen from the Bunyoro district of Uganda that is specifically distinct from *transvaalensis*, and Monsieur François collected a number of the same species from Urundi.

Perasis carpenteri **sp. n.**

Closely allied to *Perasis transvaalensis* Ricardo, but with several constant colour-differences. Most obviously, the pleura are uniformly covered with yellow-grey tomentum over a black and red ground colour ; whereas the pleura of *transvaalensis* are distinctly striped, with the anterior-facing areas of mesopleuron and sternopleuron shining black through thin brown tomentum, and the posterior-facing areas covered with thick yellow-grey tomentum. In *carpenteri* the whitish hind margins of the abdominal segments are uniform in breadth, whereas in *transvaalensis* they are expanded laterally and constricted in the middle.

♀ *Head* black. Frons and face with a dense tomentum or pile, which is white when the light falls from one direction. Moustache limited to about ten strong black bristles on mouth-margin and a few scanty hairs above this ; most of face with tomentum only, no strong hairs or bristles. A few white hairs in beard, otherwise hairs and bristles of head are black. Antennae black or a little reddish, palpi and proboscis black, all with black bristles.

Thorax. Mesonotum black, reddish only on humeri and postalar calli. These areas have some whitish tomentum, which spreads across hind margin of mesonotum, immediately before scutellum. Mesonotum otherwise with very short, adpressed, dark brown hairs ; scutellum, in contrast, with yellowish adpressed hairs. Pleura reddish in ground colour, but with a big black area anteriorly on meso- and sternopleura ; the whole pleural area covered uniformly with yellowish grey tomentum, without the rather bare vertical stripe that is seen in *transvaalensis*. Metapleural tuft of black bristles.

Abdomen. Dorsum dull black, obscured by very short, adpressed, black hairs. Each segment posteriorly with a narrow band of uniform width, reddish in ground colour, with whitish tomentum. Venter similar, black hairs rather longer.

Legs. Coxae reddish in ground colour, with pale yellowish hairs. Femora black with short black hairs ; tibiae and tarsi dull reddish, covered with yellowish white hairs, but all leg-bristles black.

Wings. Veins black, not partly yellowish as in *transvaalensis*. Fairly uniformly stained brown, only slightly paler towards wing-margin. Venation as in *transvaalensis*, but with stalks of closed cells a little longer.

Length. Body 13 mm ; wing 11 mm.

♀ Generally similar, but with a few differences. Frons and face with more yellowish white hairs, especially in space between membrane and bases of antennae. Mesonotum covered with adpressed yellowish grey hairs like those of scutellum, and with a very narrow median line and a pair of postscutellar spots formed from dark brown hairs. Femora dull reddish in ground colour and covered with adpressed pale hairs instead of dark.

Holotype ♂. UGANDA : Bunyoro, v.1928 (*G. D. H. Carpenter*) (BMNH).

Paratypes. URUNDI : Kinanga, Ruzizi, 3 ♂, 8 ♀, xi.1951 (*F. J. François*) (FJF).

HOPLISTOMERUS Macquart

Hoplistomerus Macquart, 1838 : 59, Oldroyd, 1940 : 307. Type-species : *Laphria serripes* Fabricius, 1805, monotypic.

In 1940 (loc. cit.) I published a synopsis of the species of this genus, demonstrating how the genus extends over the Ethiopian Region, with the exception of the equatorial forest. A miscellany of species exists in eastern Africa, from Lake Nyasa to the Red Sea, and from this nucleus one species, *H. serripes* Fabricius, has spread through the northern savannas to the Gambia, while another, *H. nobilis* Loew, goes southwards to the Cape and S.-W. Africa.

The presence of a species of *Hoplistomerus* in the Parc National du Garamba is therefore rather surprising, until one looks at the description of the localities concerned : 483—savane arborescente, sur les herbes ; 529—galerie forestière séche ; 3282—savane arborescente ; 3298—herbacées sur le pourtour d'une prairie. In localities such as these a savanna fauna is able to establish itself within the confines of the Parc.

***Hoplistomerus garambensis* sp. n.**

(Text-figs 26, 27)

Most closely resembles *H. erythropus* Bezzi, from Somalia, from which species it differs in having black stripes on the femora ; in the abdominal colouring, which is more normal for the genus than it is in *erythropus* ; and in the male genitalia. (Text-figs 26, 27).

♂ *Head.* Black, obscured by thick, yellowish tomentum, except for a bare patch of variable extent in centre of face. Hairs and bristles all yellow or whitish. Antennae blackish or dull reddish, with yellowish hairs. Palpi pointed and rather swollen, with hairs mainly black, some yellow ; proboscis black with silvery hairs at base (part of beard) and deep yellow ones at apex. Beard silvery, occipital bristles yellow.

Thorax black. Mesonotum heavily punctured, with little or no tomentum, but covered with golden yellow hairs, white at sides ; a row of 5–6 supra-alar and one postalar bristles yellow or whitish, otherwise dorsum without bristles. Scutellum covered with yellow tomentum and very short, golden yellow hairs ; a deep, transverse groove is bare, shining black ; no marginal bristles. Pleura black with thick white tomentum ; meso- and sternopleura with a large shining black area.

Abdomen black. Each segment narrowly shining black basally, otherwise covered with long, adpressed, curled, golden yellow hairs. Laterally a patch of these adpressed hairs is silvery white. First five complete segments each has 1–4 strong bristles laterally. Venter rather bare, black-brown, with thin grey tomentum and sparse pale hairs. Male genitalia as in Text-fig. 27.

Legs. Coxae like pleura, black with thick white tomentum and white hairs. Trochanters, femora, tibiae and tarsi orange, only femora with dorsal black stripe over middle part of their length. Short clothing hairs white, even on tarsi ; bristles yellow. Ventrally on hind femora the tubercles as usual in *Hoplistomerus*.

Wings. Venation normal for genus. Marginal cell closed on margin, vein R_{2+3} recurrent. First and fourth posterior cells closed with short stalk. Dark microtrichiae form the usual two cross-bands across base of discal cell, and from radial fork to apex of wing, the two united posteriorly. Veins blackish brown in dark areas, orange in clear patches.

Length of body 13 mm ; of wing 11 mm.

Holotype ♂. P.N.G., 3282, Ppk. 14/g/2, 4.iv.1952 (IPNC).

Paratypes. Same data as holotype, 1 ♀ ; 483. I/a/1. 1 ♀, 5.v.1950 ; 422, I/a/3. 1 ♀, 17.iv.1950 ; 529 Akam, 19.v.1950 (IPNC).

TRICHARDIS Hermann

Trichardis Hermann, 1906 : 137 ; 1920 : 177. Type-species : *Laphria testacea* Macquart, 1838 (=*Trichardis testacea* Hermann, 1906), by designation of Hermann, 1923.[3]

Strobilothrix Becker, 1907 : 42. Type-species : *Strobilothrix albipila* Becker, 1907, monotypic.

Closely allied to *Hoplistomerus* Macquart, and not easy to separate clearly from that genus. Hermann's first two species, *testacea* and *picta*, were distinguished by the absence of the conspicuous wart-like excrescences beneath the hind femora, but in other species which he later assigned to *Trichardis* the ventral spines arise from smaller, but distinct protuberances. As I recorded in 1940 (p. 310, *note*), the late Dr S. W. Bromley considered that *Trichardis* was only a subgenus of *Hoplistomerus*, but I am still not sure that I agree with this view. In general facies the two genera seem to be distinguishable, *Hoplistomerus* being more robust. Probably they can be formally separated by the different relative length of the first segment of the hind tarsus, as well as by the male genitalia, *Hoplistomerus* having the claspers prominent and usually hooked.

Since *Trichardis* does not appear to penetrate into the Congo Basin proper, this is hardly the place in which to attempt a detailed study of the genus, but one new species from the south-eastern uplands may be noted.

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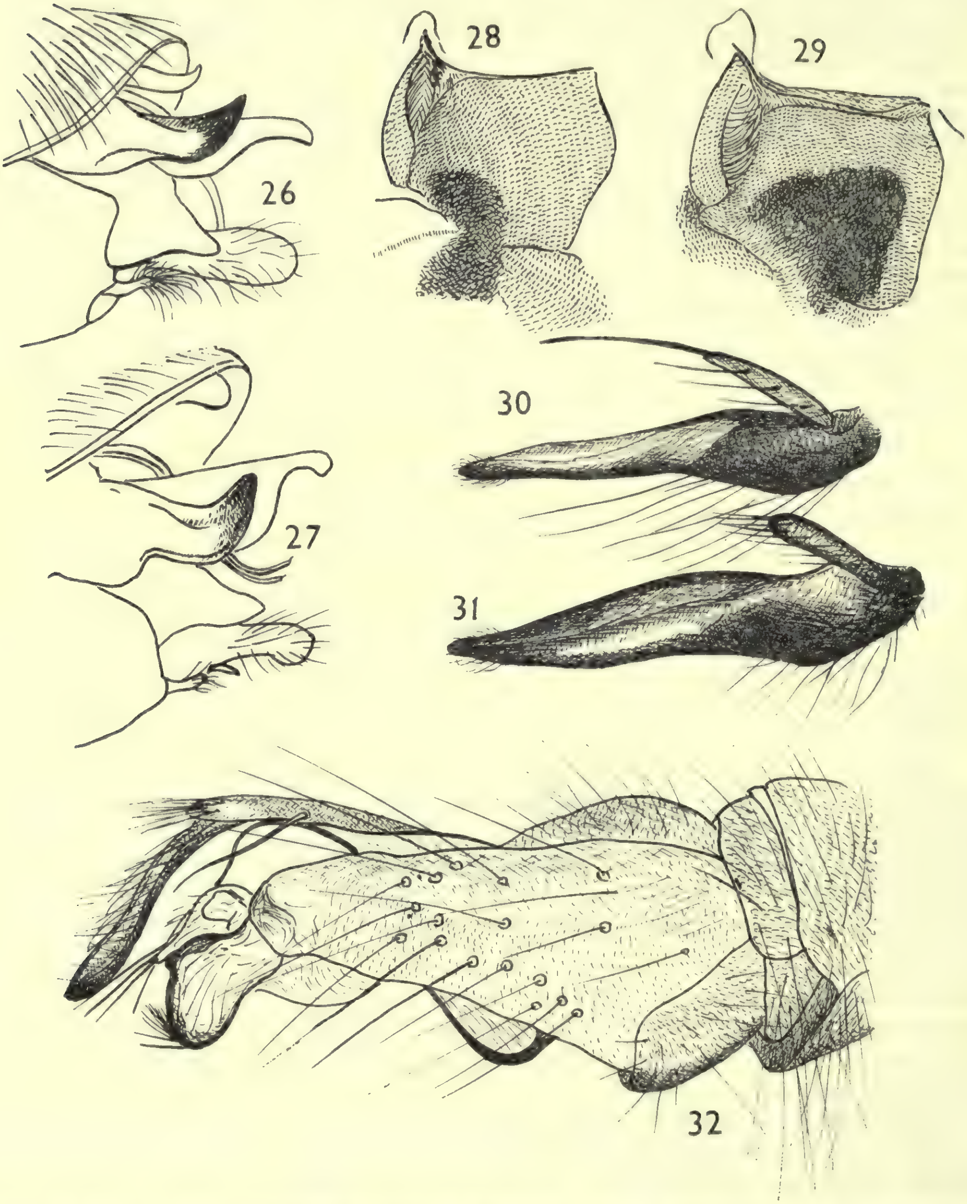
[3] Engel (1924 : 106) stated categorically that *Laphria testacea* Macquart was a *Storthyngomerus*, and was quite different from *Trichardis testacea* Hermann. This is not in agreement with Macquart's original description, in which the antennae are described as 'assez courtes'. Dr. L. Tsacas has very kindly examined Macquart's type in Paris and confirms: (a) that it is definitely a *Trichardis* and not a *Storthyngomerus*; and (b) that it agrees with the description of *Trichardis testacea* Hermann.

Trichardis katangaensis sp. n.

(Text-fig. 29)



FIGS 26–32. 26–27, *Hoplistomerus* spp., ♂ genitalia. 26, *H. erythropus* ; 27, *H. garambensis*. 28–29, *Trichardis* spp., left mesopleuron. 28, *T. cribrata* ; 29, *T. katangaensis*. 30–32, *Andrenosoma* spp. 30, *A. complexa*, proboscis and palp ; 31, *A. boranica*, proboscis and palp ; 32, *A. complexa*, male genitalia.

Very closely resembling *T. cribrata* Loew, but distinguished by the much larger bare area of the mesopleuron (Text-figs 28, 29), and by the larger and more conspicuous white patches in the posterior angles of the abdominal tergites.

♂♀ *Head.* Black with thin white tomentum. Four strong black ocellar bristles ; sides of frons with one or two short black bristles, but also softer white ones. Moustache consisting of a few black bristles on mouth-margin, and longer, silvery hairs and fine bristles rooflike above these, extending at sides almost up to bases of antennae. Centre of face with some fine black hairs. Antennae may be entirely black, or more or less reddish, especially first two segments. Proboscis and palpi black, but with hairs mainly silvery. Fine, silvery hairs in beard and over occiput, but postocular bristles strong and black.

Thorax. Mesonotum shining black, with little tomentum except for a white patch adjoining humeri, and a narrow, transverse band immediately before scutellum. Covered uniformly with short, adpressed, golden yellow hairs, with short, erect, fine, black hairs distributed among them. Scutellum with very fine black marginal bristles. Pleura heavily covered with white tomentum, only mesopleuron with a large, shining black area (Text-fig. 29).

Abdomen shining dark red-black, covered with rather sparse, silky silvery hairs, each hair arising from a definite puncture. A broad posterior band of white tomentum on each segment is broadly interrupted, or reduced to a pair of widely separated lateral patches. Venter dark reddish, with white hind margins and whitish hairs.

Legs. Hind femora markedly swollen, and with considerable tubercles. Femora shining black ; trochanters, tibiae and tarsi dull reddish. Legs covered with silvery hairs ; bristles mostly yellow, but black ones more numerous on tarsi.

Wings almost uniformly pale greyish, no obvious pattern. Marginal cell closed on margin, vein R_{2+3} recurrent ; first and fourth posterior cells closed, with short stalk.

Length of body 10 mm ; of wing 8 mm.

Holotype ♂. LULUA : Kapanga, x.1932 (*F. G. Overlaet*) (MRAC).

Paratypes. KATANGA : Elisabethville, 1 ♀, xi.1911 (*Miss. Agric.*) ; TANGANIKA : Sunkutu, 1140 m, Km 96, Rte Pepa-Moliro, 1 ♀, xii.1953 (*H. Romans*) (MRAC).

HYPERECHIA Schiner

Hyperechia Schiner, 1966 : 673 ; Marshall, 1902 : 287–584 ; Grünberg, 1907 : 515–524 ; Thorpe, 1927 : 177–185 ; Lamborn, 1927 : 44–47 ; Engel, 1929 : 147–162 (larva) ; van Bruggen, 1962 : 313–317. Type-species : *Laphria xylocopiformis* Walker (an Indian species), by original designation.

Flies of this genus are well-known because of their close resemblance to Xylocopid bees. They are short and broad, with strong legs fringed with long pile, and with wings broad basally, pointed at apex. The head is broad, the third antennal segment long and clavate. The flattened, leaf-like palpi are characteristic of those genera which Hull (1962 : 349) unites into the tribe Andrenosomini. The genus *Hyperechia* is characterized by general appearance rather than by any diagnostic character. *Systropalpus* Hull (1962 : 355), mentioned in the key to genera, is based on a single male from Ethiopia, which I have not seen.

The various species differ in the distribution of white, yellowish or reddish pile on the mesonotum, scutellum, abdominal segments 1–3, and legs. Several species bear a startlingly close resemblance to particular species of *Xylocopa*, and to this extent they may be said to mimic the bees, especially as the larva of the fly lives in the burrows of the bee, and the adult flies are found in association with the adult bees. Yet *Hyperechia* adults are often taken in association with *Xylocopa* other than the species to which they bear a mimetic resemblance. An example of this occurs in the collections from the Musée du Congo, where a specimen of *Xylocopa flavorufa* Deg. from Abok in the Ituri is labelled as having been taken in association with *Hyperechia imitator* Grün. ; but the species of *Hyperechia* which imitates this species of *Xylocopa* is *H. bomboides* Loew, which occurs at Tchad and similar drier regions.

The following key is presented as an interim guide to the species, more particularly those of the Congo Basin, or which might occur there.

KEY TO SPECIES OF *HYPERECHIA*

1 Sides of abdomen with pale yellowish or white fringes 2
– Sides of abdomen with black fringes, at least on posterior segments 4
2 Mesonotum and scutellum with black hairs only
consimilis Wood, 1874 : 158 (***usambarae*** Lichtw., 1907 : 85)
– Pale hairs on, or just before, scutellum 3
3 A conspicuous tuft of pale hairs on scutellum, with black marginal bristles
floccosa Bezzi, 1908 : 377 (p. 251)
– A transverse band of pale hairs just before scutellum, but scutellum itself has black hairs, and very strong black marginal bristles . ***nigrita*** Grünberg, 1907 : 520 (p. 251)
4 Thorax and abdomen both uniformly black, with black hairs. Female with white fringe on fore tibia, male with black fringe . ***imitator*** Grünberg 1907 : 522 (p. 251)
– Thorax, or abdomen, or both with conspicuous white, yellow or red-brown hairs . 5
5 Thorax and abdomen both with some yellow hairs 6
– Either thorax or abdomen with yellow hairs, but not both (except in *marshalli*, where the first abdominal segment has a few sparse yellow hairs) 8
6 Thorax with yellow hairs on posterior margin, and segments 1–3 of abdomen also with yellow hairs . . ***nigripennis*** Wied., 1830 : 646 (***albifasciata*** End., 1930 : 69)
– Thorax with yellow hairs, but only segments 1 or 1–2 of abdomen with yellow hairs 7
7 Mesonotum and scutellum entirely covered with yellow hairs. Wings dark brown, with base conspicuously paler . . . . . ***hirtipes*** Fabricius, 1805 : 158
– Only posterior third or quarter of mesonotum with yellow hairs. Wings uniformly dark brown, not obviously paler basally
bifasciata Grünberg, 1907 : 579 (***pellitiventris*** End., 1930 : 68)[4] (p. 250)
8 Hairs of mesonotum uniformly pale . . . . . ***bomboides*** Loew, 1851 : 21
– Thorax black with some yellow or red-brown hairs
marshalli Austen, 1902 : 341 (***fuelleborni*** Grünberg, 1907 : 521)

Hyperechia bifasciata Grünberg

Hyperechia bifasciata Grünberg, 1907 : 519.

LULUA : Luluabourg, 1 ♀ (*P. Callewaert*) ; Kapanga, 2 ♂, v.1933 (*G. F. Overlaet*) ; Kanzenza, 1 ♀, 1932 (*R. P. Lefebure*). KATANGA : du lac Moero au lac Bengwelo, 1 ♂ (*Dr Gheral*) ; Kiambi, 1 ♀, 5–15.v.1931 (*G. F. de Witte*) ; Elisabethville, 1 ♀, 25.4.27 (*Dr M. Bequaert*). SANKURU : Tschombe-Ste Marie, 1 ♀, 1948 (*Rév. P. Gustave*) ; Komi, 1 ♀, vii.1928, Lodja (*J. Ghesquière*) ; Mukabe-kesari, 1 ♀, 1939

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[4] *bifasciata* and *pellitiventris* may be distinguishable by small genital differences.

(*R. P. de Donckere*). TANGANIKA : Kiambi, 1 ♀, 23.iv.1931 (*G. F. de Witte*). ITURI : Bunia, 2 ♀, vii.1937 (*H. J. Brédo*) (MRAC).

URUNDI : Kitega, 1 ♀, 18.i.52 ; 1 ♂, 1.1953 (FJF).

Hyperechia floccosa Bezzi

Hyperechia floccosa Bezzi, 1908 : 377.

LULUA : Kapanga, 1 ♂, v.1933 (*G. F. Overlaet*). BAS-CONGO : Kisantu, 1 ♂, 29–30.xii.1952 (*P. Basilewsky*) ; Matadi à Léopoldville, 1 ♀, 11.xi.1936 (*J. Vrydagh*). Kunkungum N'Kele, 1 ♂, 1 ♀, 16.viii.1944 (*C. Schouteden*) (MRAC).

Hyperechia imitator Grünberg

Hyperechia imitator Grünberg, 1907 : 522.

BAS-CONGO : Moanda, 1 ♀, 1933 (*R. P. Bittremieux*) ; Kisantu, 1 ♀, 29–30.xii.1952 (*P. Basilewsky*) ; BOLOBO : Makamndelu, N'Kele, 2 ♀, 1938 (*Dr Schouteden*) ; Bumbuli, 1 ♂, 1915 (*R. Mayné*). ITURI : Abok, Lundigi, 1 ♀, 1928 (*Ch. Scops*) (MRAC).

Hyperechia nigrita Grünberg

Hyperechia nigrita Grünberg, 1907 : 520.

BAS-CONGO : Kimwenza, 1 ♂, 1.iv.1956 (*R. P. van Eyen*) ; Kisantu, 1 ♂ (*Rév. P. Regnier*). KASAI : Luebo, 1 ♀, iii.1931 (*J. P. Colin*). UELE : Bambesa, 1 ♀ 10.iv.1937 (*J. Vrydagh*) (MRAC).

PROAGONISTES Loew

Proagonistes Loew, 1857 : 362, 367 ; 1860 : 170 ; Bromley, 1930 : 209–224. Type-species : *Proagonistes validus* Loew, monotypic.

These large, aggressive-looking robber-flies are distinguished by their powerful, sickle-like proboscis, usually upturned at the tip, and by their bare, elongate appearance, mimicking some of the bigger wasps, especially Psammocharid wasps of the genus *Salius*.

Neave (quoted by Bromley, 1930 : 213) associated flies of this genus with forest, or at least with woodland, and wrote : ' I have never found them except in association with trees.' Specimens from the Congo Basin suggest that *Proagonistes* is not typical of high forest, but occurs along the great rivers, on the forest fringe, and in savanna woodland.

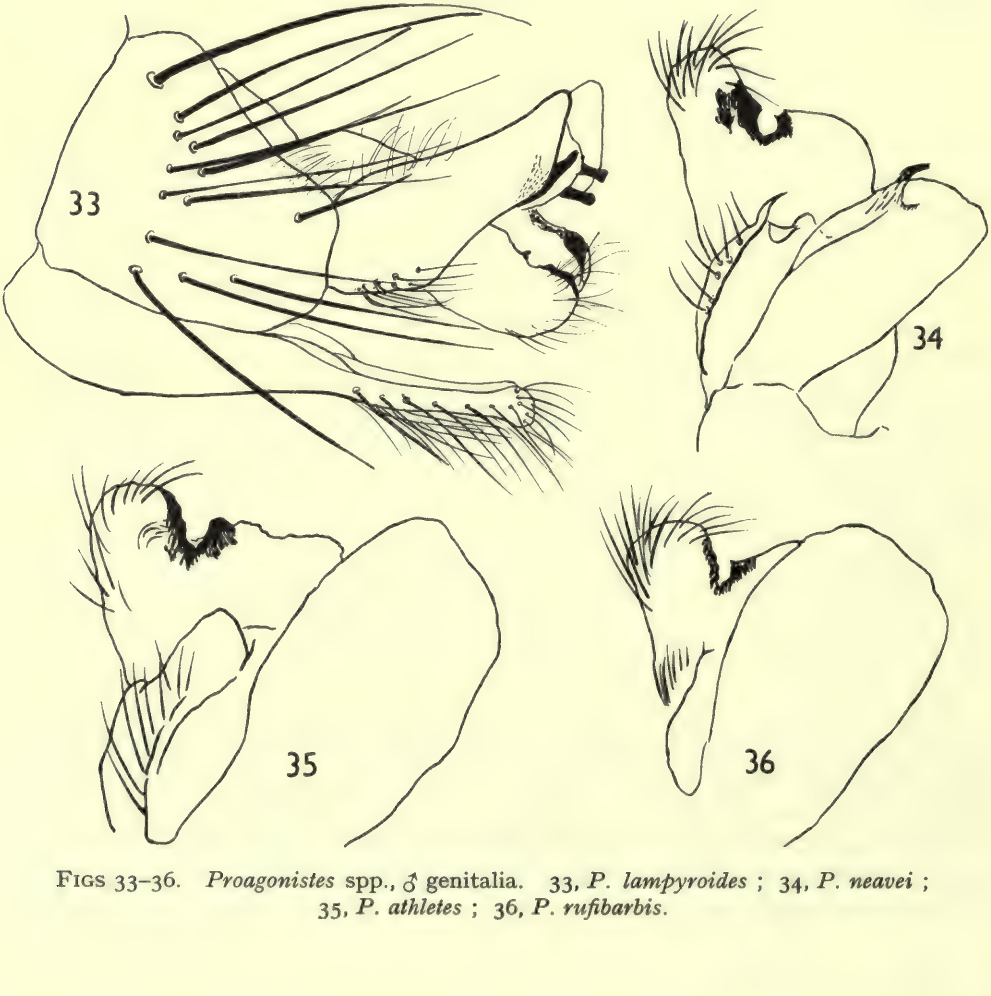
The genus is quite closely related to *Andrenosoma* Rondani, and it is not easy to indicate constant differences between the two genera, though each has a recognisable *facies*. *Proagonistes* is more elongate, with long, slender legs, and cylindrical abdomen which is scarcely constricted basally. In the wing the first posterior cell is wide open, with veins R_5 and M_1 parallel, or even diverging slightly. *Andrenosoma* is typically more bee-like, the abdomen broader, and often constricted basally; the hind legs stouter, with distinct long hairs on tibiae and tarsi in addition to stout bristles ; and in the wing the first posterior cell is narrowed, often closed and stalked.

Bromley (1930 : 209–224) published a revision of the genus *Proagonistes*, to which may be added two species of hitherto doubtful affinities : *Nusa africana* Ricardo, and *Proagonistes igniferum* Engel and Cuthbertson, both of which have at some time or other been assigned to *Andrenosoma*. One new species from the Congo Basin is described in the present paper.

The following key is modified from Bromley (1930 : 214), and includes all the African species.

KEY TO AFRICAN SPECIES OF *PROAGONISTES*

1 Wings orange, apex broadly brownish . . . ***apicalis*** (Curran), 1927 : 6 (p. 254)
– Wings without noticeably darker tip, usually completely brown, or with clearer centres to some cells 2



FIGS 33–36. *Proagonistes* spp., ♂ genitalia. 33, *P. lampyroides* ; 34, *P. neavei* ; 35, *P. athletes* ; 36, *P. rufibarbis*.

2 Hind tarsi with fine blackish hairs, causing them to appear black dorsally. Facial and pleural hairs deep yellow or orange. Abdomen deep purplish brown with reddish hairs . . . . ***leoninus*** Bromley, 1930 : 216 (p. 254)

– Hind tarsi with orange hairs only 3

3 Scutellum uniformly black 4

– Scutellum not uniformly black 16

4 Hind femora reddish or yellowish 5

– Hind femora more or less black 11

5 Vestiture of head mostly black. 6

– Vestiture of head reddish or yellowish 7

6 Beard white. Antennae and facial knob black. Abdomen reddish ***africana*** Ricardo, 1929 : 278

– Beard black. Antennae and facial knob red. Abdomen black ***pliomelas*** Speiser, 1907 : 358 (p. 255)

7 Moustache long and thick, straw-yellow. First two segments of abdomen with fine white hairs at sides . . . . ***mystaceus*** Bromley, 1930 : 218

– Moustache reddish 8

8 Thorax with bristles mostly reddish . . . . . ***vulpinus*** Bromley, 1930 : 219

– Thorax with bristles black 9

9 Huge species, about 45 mm in length, hind legs extremely long (Madagascar) ***gigantipes*** Bromley, 1930 : 219

– Species about 30 mm in length (West Africa) 10

10 Occipital bristles black. Thorax black, but with slight brassy tinge, and covered with dark tawny down. . . . . ***ufens*** Walker, 1849 : 372

Occipital bristles reddish ; thorax black . ***rufibarbis*** (Fabricius), 1805 : 157 (p. 255)

11 Fore coxae with black hairs, beard black, or with some reddish hairs intermingled 12

– Fore coxae with whitish hairs 13

12 Small species (about 27–28 mm long) ; beard black ; femora black with extreme apex reddish . . . . ***praeceps*** Walker, 1855 : 542

– Huge species (over 40 mm long) ; beard black with some of the hairs reddish at base ; hind femora black, apically reddish, more extensively reddish below than above . . . . ***saliodes*** Bromley, 1930 : 221

13 Thorax mostly black 14

– Thorax broadly reddish anteriorly and along sides above wings ; a reddish line on each pleuron . . . . ***austeni*** Bromley, 1930 : 221

14 Hind femora mostly black 15

– Hind femora mostly yellowish, but apically black, especially dorsally ***praedo*** Austen, 1909 : 57

15 Large, robust species (29–43 mm) ; beard reddish . . ***athletes*** Speiser, 1907 : 356

– Smaller, slenderer species (23–31 mm) ; beard straw-coloured ***neavei*** Bromley, 1930 : 223 (p. 255)

16 Dorsum of thorax orange, unpatterned, contrasting sharply with black-brown pleura and slightly shining, blue-black abdomen ***redimiculum*** Speiser, 1914 : 7 (p. 255)

– Dorsum of thorax orange with distinct black stripes and spots ; not contrasting sharply with pleura, which are patchily black and orange, obscured by white tomentum 17

17 Abdomen orange with orange hairs and bristles. Black longitudinal stripes of mesonotum reaching scutellum and extending laterally into connecting black spots ***igniferum*** Engel & Cuthbertson, 1937 : 12

– First five abdominal segments black, rest bright orange. Black longitudinal stripes of mesonotum not reaching scutellum, and not connected with any lateral spots ***lampyroides*** sp. n. (p. 254)

Proagonistes apicalis (Curran)

Lamyra apicalis Curran, 1927 : 6 ; 1928 : 331.
Proagonistes apicalis (Curran) Bromley, 1930 : 216.

LULUA : Kapanga, 1 ♂, ii.1934 (*G. F. Overlaet*). COQUILHATVILLE : Eala, 1 ♂, vi.1932 (*A. Corbisier*). STANLEYVILLE : Yangambi, 1 ♀, 30.vii.1959 (*J. Decelle*).

***Proagonistes lampyroides* sp. n.**

(Text-fig. 33)

Shares with *P. apicalis* (Curran) and *P. redimiculum* Speiser the orange, black-banded mesonotum, but is distinguished from *apicalis* by the wholly dark wings, and from *redimiculum* by the conspicuous red tip to the black abdomen. This involves the sixth and following segments, and the ovipositor is distinctly shorter than that of ♀ *redimiculum*.

♀ *Head*. Red. Ocellarium has a small, black patch running longitudinally, not transverse as in *redimiculum*. Frons otherwise rather bare and shining brown ; rest of head, including buccae and occiput, orange with orange tomentum, bristles and hairs ; only a small tuft of whitish hairs in beard. Palpi red with orange hairs. Proboscis red at base, shining black for most of its length, but with orange hairs. Antennae orange with orange hairs, third segment about twice as long as first two segments together.

Thorax. Orange with black pattern. On mesonotum a pair of longitudinal black stripes from anterior margin almost to reach scutellum ; on each side a roundish black spot before transverse suture and an elongate triangular black spot posteriorly. Scutellum entirely orange. Sides of pronotum, propleuron, mesopleuron and sternopleuron with round black spots ; otherwise pleura orange with tomentum that is mostly white, especially ventrally and posteriorly. Postnotum (' metanotum ') orange with a pair of black spots.

Abdomen. First five segments dorsally and ventrally black with black-brown tomentum and predominantly black short hairs ; some orange hairs laterally on tergites, where there are one or two orange bristles on all five segments. Sixth segment and posteriorly bright orange with orange hairs.

Legs. Coxae like pleura but with white hairs as well as white tomentum ; legs otherwise entirely orange, with orange or yellow hairs ; only claws apically black.

Wings. Entirely black-brown, with orange hairs on base of costa. Halteres orange.

Length of body 23 mm ; of wing 20 mm.

Holotype ♀. GABON : Lambaréné, 1921 (*E. le Moult*) (MHNP).

Paratypes. CONGO : Riv. de San Benito, 1 ♂ (*Quivae*). EQUATEUR : Bokuma, 1 ♀, vii.1932 (*R. P. Lootens*) (MRAC).

Proagonistes leoninus Bromley

Proagonistes leoninus Bromley, 1930 : 216.

ILE DE SÃO THOMÉ : 1 ♀ (*De Saeger* ; *S.A.R. Prince Leopold*) (MRAC).

São Thomé is the type-locality of this species.

Proagonistes neavei Bromley

Proagonistes neavei Bromley, 1930 : 223.

UELE : Bambesa, 1 ♀, iii.1937 (*J. Vrydagh*) (MRAC).

Originally described from UGANDA, this is a robber-fly that may well occur in the Parc National du Garamba.

Proagonistes pliomelas Speiser

Proagonistes pliomelas Speiser, 1907 : 358 ; Bromley, 1930 : 217.

LULUA : Kapanga, 3 ♂, 1 ♀, xi.1932 (*G. F. Overlaet*). UELE : Bambesa, 1 ♂, 30.x.1933 (*J. V. Leroy*). LUALABA : Sandoa, 1 ♀, vi.1932 (*G. F. Overlaet*) (MRAC).

Described from the northern Cameroons, and known also from Ghana and Mayumbe.

Proagonistes redimiculum Speiser

Proagonistes redicimiculum Speiser, 1914 : 7 ; Bromley, 1930 : 217.

COQUILHATVILLE : Eala, 19.x.1931 (*H. J. Brédo*) (MRAC).

Originally described from Tiko, near Victoria, in the Cameroons. The present specimen agrees closely with Speiser's description, except that the scutellum is entirely fire-red, instead of being black with a red tip. The rest of the colour-pattern is so striking, with the bright red head, thorax and legs, coupled with black pleura, abdomen and wings, that I think we must accept the two as conspecific.

Proagonistes rufibarbis (Fabricius)

Laphria rufibarbis Fabricius, 1805 : 157.
Lamyra rufibarbis (Fabricius) Curran, 1928 : 331.
Proagonistes rufibarbis (Fabricius) Bromley, 1930 : 220.

LULUA : Kapanga, 5 ♂, 3 ♀, 1932–3 (*G. F. Overlaet*). STANLEYVILLE : Basoko, 1 ♂, iv.1948 (*P. L. G. Benoit*).

Curran (loc. cit.) recorded this species from Malela.

ANDRENOSOMA Rondani

Andrenosoma Rondani, 1856 : 160 ; Hull, 1962 : 349. Type-species : *Asilus ater* Linnaeus, 1758, monotypic.

The affinities of this genus are discussed briefly under *Proagonistes*. *Andrenosoma* occurs in all the major zoogeographical regions, but is an enigmatic genus everywhere ; the huge *Andrenosoma* of Australia and South America have little obvious affinity with the three distinctive Palaearctic species. The species of tropical Africa have been particularly obscure, since they have never numbered more than one or two, and these have been questioned, and in some cases transferred to other genera ; e.g. *africana* Ricardo and *igniferum* Engel & Cuthbertson to *Proagonistes* in the present work.

At present only two remain, separable as follows :

KEY TO SPECIES OF *ANDRENOSOMA* IN TROPICAL AFRICA

1 Mesonotum tomented, with a pattern of dark brown stripes on an ashy grey ground. Post-vertex entirely covered with grey tomentum. Proboscis and palpi as in Text-fig. 31 . . . . **boranica** (Corti)

– Mesonotum with a broad, bare, median stripe, flanked by double spots, which are also bare and shining. Post-vertex with a large, triangular, bare, shining area. Proboscis and palpi as in Text-fig. 30 ; male genitalia as in Text-fig. 32 **complexa** Sp. n.

Andrenosoma boranica (Corti) was described from Ethiopia, and is also known from the savannas of West Africa. (Text-fig. 31).

Andrenosoma complexa sp. n.

(Text-figs 30, 32)

Distinguished from *boranica* by the characters given in the key. The unique specimen is somewhat teneral, but even so its mahogany-brown colour is probably natural.

♂ *Head.* A pronounced, rounded facial tubercle occupies half of height of face ; face and frons with white tomentum and long white hairs at sides, but bare in middle line, both below antennae and in a median frontal area which includes ocellar tubercle and a large triangular area of post-vertex. Moustache consists of about a dozen long, black bristles, flanked by long white hairs from sides of face. Ocellar tubercle with a pair of long, backwardly curved black bristles, and numerous black bristles on upper occiput ; lower occiput and buccae with soft, silvery hairs. Palpi and proboscis as in Text-fig. 31 : proboscis slender, more pointed than in *boranica*, palpi smaller, but still flattened, scale-like as typical of genus ; hairs at tips of palpi and bulbous base of proboscis longer than in *boranica*. Antennae black, with reddish joints, black bristles and white hair ; clavate third segment about as long as sum of first two segments.

Thorax in ground colour mahogany-brown, with white tomentum, which leaves bare areas dorsally ; on mesonotum a broad median stripes, complete from front to rear, flanked by broad sublateral stripes extending from rear to just in front of transverse suture. Scutellum with white tomentum basally and a bare, shining tip. Hairs and bristles fine, long, black ; scutellum with six marginal bristles. Pleura entirely covered with white tomentum : all sclerites with long, fine white hairs, mixed with a few black ones dorsally ; mesopleuron with a single strong black bristle.

Abdomen also mahogany-brown in ground colour, with white tomentum thin dorsally, but never quite absent ; dorsally with fine black hairs, laterally and ventrally with longer white hairs. Male genitalia as in Text-fig. 32, long and complex, with long black hairs and bristles.

Legs. Coxae covered with white tomentum ; rest of legs mahogany-brown with abundant long, silky hairs, which are black dorsally on tibiae and tarsi, and tips of femora, white elsewhere.

Wings. Uniformly faintly greyish, without darker colour ; veins dark brown, marginal and fourth posterior cells closed, with long stalk, anal cell with short stalk ; first posterior cell fully open, veins R_5 and M_1 running parallel to margin.

Length of body 19 mm ; of wing 14 mm.

Holotype ♂. BAS-CONGO : Moerbeke (*P. Domage*) (MRAC).

Tribe ATOMOSIINI

The tribe Atomosiini is a compact group of Asilidae, which look rather like small solitary bees. They are united by a peculiarity of wing-venation, in which the veins forming the posterior, apical angle of the discal cell form a cross +, or a displaced crossing $\frac{|\;\;}{\;\;|}$. Though apparently trivial, and occasionally to be found in other tribes, this detail is a very constant point of recognition. Hull (1962 : 369) points out that almost diagnostic of this tribe is the sclerotization of the area immediately behind the hind coxae, but this detail is not so easily observed as the wing-venation.

Atomosiini are divided into a very large number of genera, most of which are confined to South America. Hermann (1912) established most of them. These genera are justified by the number of structural variations that occur, especially in the head and antennae, but it is doubtful how far these differences are of generic value. The tribe is generally placed in the subfamily Laphriinae, but a much fuller study is needed to establish its true relationships. (cf. Karl, 1959).

In the Ethiopian Region only a very few species of Atomosiini have been described. Hermann created the genus *Goneccalypsis* for *Atomosia argenteoviridis* Hermann from the Transvaal. Engel (1929) described *Loewinella nigripes* from Southern Rhodesia as a variety of the Palaearctic *L. virescens* (Loew), but it seems clear that this should be treated as a distinct species. *Loewinella aphaea* Séguy (1950) comes from the oasis of Aïr (Agades) in the Sahara, and Curran (1927) described an *Atractia arcuata* from Stanleyville.

The last species is well represented in the collection of the Musée du Congo, and is not an *Atractia* (as, indeed, Curran suspected) ; it is clearly congeneric with *Loewinella nigripes* Engel.

Loewinella arcuata (Curran) comb. n.

Atractia arcuata Curran, 1927 : 5.

Coquilhatville : 1 ex., 10.xi.1931 (*Lt. Doman*) ; Eala, 8 ex., xi.1931–v.1932 (*H. J. Brédo*) ; 1 ex., 22.vii.1914 (*R. Mayné*) ; 1 ex., xi.1934 (*J. Ghesquière*). Stanleyville : 22 ex., ii–iii.1928 (*A. Collart*) (MRAC).

Tribe SAROPOGONINI

Modern attempts to improve upon Loew's division of the Asilidae into four subfamilies find most difficulty in subdividing Loew's Dasypogoninae. Workers in each region tend to give prominence to genera that are peculiar to their own region : thus G. H. Hardy (1934), a pioneer of tribal classification in Asilidae, erected tribes Phellini, Chrysopogonini and Brachyrrhopalini that are all restricted to Australasia; while Carrera (1952) recognized a tribe Megapodini for certain S. American genera.

The world classification of Hull (1962) goes further than any other, breaking the old Dasypogoninae into twelve tribes. At the present stage of knowledge of the

African Asilidae it is not profitable to comment critically upon this arrangement, beyond saying that it appears to raise problems in placing certain genera. I shall therefore continue to use the classification set out in my earlier paper (Oldroyd, 1963), and divide the old Dasypogoninae into three tribes : Saropogonini, Stichopogonini and Xenomyzini. Of these, Saropogonini are recognized by having the prosternum completely separated from the pronotum, and appearing as a small sclerite surrounded by membrane. This is usually visible from the side, or below, though it may be necessary first to brush off some of the obscuring hairs.

Out of the 26 genera included in my key to African Saropogonini (Oldroyd, 1963 : 6) the present collection contains only eight, together with one new genus, *Dogonia*. There is therefore little point in reprinting the key, but a few notable absences may be recorded. *Sisyrnodytes* and *Acnephalum*, *Saropogon* and *Stenopogon* are generally associated with somewhat arid terrain ; *Habropogon*, *Holopogon* and *Heteropogon* are essentially subtropical or Mediterranean genera : *Hypenetes*, *Lycostomus*, *Teratopus*, *Hermanella* and *Spanurus* are found in more southerly parts of Africa, although any one of these may yet be found within the Congo Basin.

NEOLAPARUS Loew

Laparus Loew, 1851 : 4 ; [nec *Laparus* Billberg, 1820, Lepidoptera]. Type-species : *Laparus tabidus* Loew, by original designation.
Neolaparus Williston, 1889 : 255 [new name].
Cenopogon Wulp, 1898 : 120. Type-species : *Cenopogon bifidus* Wulp, monotypic.

Specimens of *Neolaparus* are abundant in collections of African Asilidae, and are extremely difficult to classify. Structurally they are remarkably uniform. The face bulges a little below the antennae, and projects as a rim on the epistoma, but has no clearly defined knob, and the moustache is very sparse, generally consisting of two or four stiff bristles with at most a few fine hairs. Only rarely is there a more extensive moustache. The third antennal segment is usually clubbed, and is elongate only in one or two species. The male terminalia are fairly elaborate, and show some inter-specific variation, but only rarely is this decisive enough to be diagnostic. The wing-venation is primitive, and remarkably uniform.

The species therefore are mostly defined by colour and pattern, chiefly of the thorax and abdomen. These are reasonably reliable in well preserved specimens, but unfortunately are quickly ruined by bad preservation. A great majority of all specimens available for study are badly greased, and one can only guess at their natural appearance.

As long ago as 1860 Loew made very similar comments about the difficulty of classifying species of this genus, which he divided into two sections, one with only two strong bristles on the epistoma, and the other with four or even six. Bromley (1956 : 140), while using this arrangement in his key, wrote : ' This is not a good grouping, as the number of bristles may vary within a species '. There is, nevertheless, evidence of a division of the genus into two groups of species, the one consisting of larger and darker flies, the other more fragile and paler in colour. The first group have the alula of the wing larger, and with a distinct posterior angle, whereas the flies of the second group have the alula smaller, and with its posterior margin only slightly convex.

Hull (1962 : 256) says that : ' Both sexes of *Lagodias* may be separated from the related *Neolaparus* and also from *Pegesimallus* by the absence of the ventral hypopleural patch of dense pile '. This is true of the type-species of each genus, but is not a valid generalization. This patch of pile is widespread among many genera of this and other tribes, e.g. *Laphria*, but it appears sporadically, and may be present or absent in species that are clearly congeneric.

The species of *Neolaparus* are in such confusion that it seemed better in the present paper to mention only those few specimens that come from the Parc National du Garamba, deferring a more general account of the *Neolaparus* for a more comprehensive revision. Curran's key (1934) is a useful guide if it is used with caution, but no really satisfactory key to the species of *Neolaparus* has yet been produced.

Neolaparus ophion Speiser

Neolaparus ophion Speiser, 1910 : 86.

GARAMBA NATIONAL PARK : P.N.G., 527, I/o/1, 1 ♀, 17.v.1950 ; 766, I/o/1, 1 ♂, 21.viii.1950 (*G. Demoulin*) ; 786, I/o/1, 1 ♀, 25.viii.1950 (*G. Demoulin*) ; 3480, Inimvua, 1 ex., 16.v.1952 ; 764, I/o/7, 1 ♀, 19.viii.1950 (*G. Demoulin*) ; 349, I/o/1, 1 ♀, 28.iii.1950 ; riv. Abita, 1 ♀, 1.iv.1954 (*C. Nebay*) (IPNC).

Neolaparus angusticornis Ricardo

Neolaparus angusticornis Ricardo, 1925 : 245.

GARAMBA NATIONAL PARK : P.N.G., 352, I/o/3, 1 ♂, 31.iii.1950 ; 1588, II/hc/4, 1 ♀, 20.iv.1951 (*J. Verschuren*) ; 1849, II/hc/4, 1 ♂, 31.v.1951 (*J. Verschuren*) ; 3328, Pidigala, 1 ♀, 23.v.1952; 1494, II/fd/17, 1 ♂, 4.iv.1951.

Neolaparus munroi Bromley

Neolaparus munroi Bromley, 1936 : 142.

GARAMBA NATIONAL PARK : P.N.G., 1464, II/fd/2, 1 ♂, 28.iii.1951 ; 3328, Pidigala, 2 ♂, 1 ♀, 23.iv.1952 ; 3476, Aka/2, 19.v.1952 ; 3488, Inimvua, 2 ♂, 20.v. 1952 ; riv. Abita, 1 ♂, 1 ♀, 1.kv.1952 (*C. Nebay*) (IPNC).

***Neolaparus decoratus* sp. n.**

A well-marked species, of distinctive pattern. Resembles *ophion* Speiser in having microtrichiae entirely covering the wing, and not confined to an apical area, but differs in having a clear-cut abdominal pattern, and in the bicoloured, strongly clubbed antennae.

♀ *Head*. Fronto-facial area broad, not greatly narrowed at antennae, black in ground colour, but obscured by thick tomentum. On frons this tomentum is brassy brown, more yellow along eye-margins and just above antennae, where there is a short, vertical black stripe. Face quite prominent at epistoma, but triangular in profile, with flat upper surface, tomentum yellow-brown, white laterally ; only two strong, pale bristles on epistoma, and a few short, pale yellow hairs. Probosics and palpi black, with black hairs. Antennae with first two segments yellow-brown, short, subequal, with yellow bristles ventrally, black ones dorsally ; third segment strongly clavate, pale yellow at base, black on expanded portion. A pair of yellow postvertical bristles. Occiput with yellow tomentum and a few yellow hairs.

Thorax olive-brown, with indistinct, divided, median stripe, outlined by very narrow dark brown lines, as in *ophion*. Very short black hairs, each arising from a dark spot, run along lines of dorsocentrals, and cover a large posthumeral area, as well as the rather paler lateral margins of the mesonotum. Bristles yellow, very strong, restricted to one notopleural, one supra-alar, and one postalar. Scutellar disc concolorous with mesonotum, but rim dark red-brown ; short hairs in line with dorsocentrals, but no bristles.

Pleura with brassy yellow tomentum, through which the ground colour is visible : pronotum and propleuron, mesopleuron, sternopleuron, hind coxae and a little of the other coxae show a dark ground colour ; pteropleuron, mesopleuron and metanotal callosities have a yellow ground.

Abdomen black, with a dull sheen, and therefore contrasting strongly with thorax. Dorsally first segment and base of second with bronze tomentum, leaving bare the bulla on the second segment (a feature of *Neolaparus* and *Lagodias*). Segments 2–6 each has a pair of spots of white tomentum : on second segment these are short, transverse lines, and occur at half-way position ; on each succeeding segment they become further forward until on sixth they are small spots on fore margin. These segments also have on extreme lateral margins a spot on anterior border and a short band in posterior angle. Hairs very short, very scattered, black. Venter shining black with grey hind margins. Segments 7, 8 shining black, forming an ovipositor.

Legs. Long, slender, all femora and tibiae slim on basal half, distinctly thickened towards tip. Generally chestnut-brown in colour, but femora pale on narrow basal stalk and black-brown over thicker apex. Clothing hairs black, long bristles yellow.

Wings. Venation normal, all cells open. Microtrichiae cover entire wing membrane, as in *ophion*, and do not form a grey tip. Alula very shallow, gently curved.

Length of body 13 mm ; of wing 11 mm.

♂ not yet known.

Holotype ♀. GARAMBA NATIONAL PARK : P.N.G., 3287, II/gc/6, 5.iv.1952 (IPNC).

LAGODIAS Loew

Lagodias Loew, 1857 : 345 ; 1860 : 69. Type-species : *Lagodias albidipennis* Loew, 1857 ; by monotypy.

The males of *Lagodias* are conspicuous in having some part of the legs, and especially of the hind legs, with a spectacular fringe of flattened, scale-like hairs. Apart from this feature they are typical *Neolaparus*, and the females are very difficult to recognize as *Lagodias*. Hull (1962 : 256) claims that both sexes of *Lagodias* can be distinguished from *Neolaparus* by not having the small, dense tuft of short hairs on the hypopleuron, but, as we have already seen, this is not found in all species of true *Neolaparus*.

The practical effect of this feathering of the legs is an interesting question. Hermann (1906 : 144) stresses that this is a secondary sexual character, and that the extent of the feathering varies in different species. It may be found on the tarsus only ; on the tarsi and apically on the tibiae ; on tarsi and tibiae, but not on femora ; or on all segments of the hind and middle legs. The shape of the individual scales varies, too, from slightly flattened hairs to large scales, flattened like a paddle-blade or a banana leaf.

Hermann also speculates about the possible function of the feathered legs : ' Then one can hardly avoid the conclusion that this monstrous feather-apparatus must seriously handicap the insect, which is far from robust, and it can therefore be imagined that the insect possibly hunts its prey over the smooth surface of water, and that when the feathers are erected they may form a swimming paddle.'. He wisely adds that this remains mere speculation until observations on the habits of these flies can be recorded—observations that are still wanting, nearly sixty years later. On the whole Hermann's guess seems rather unlikely, the more so since both sexes seem to have the same hunting habits. Is it not more likely that the ornamentation of the legs of the males contributes to sexual display, and that the so-called genus *Lagodias* is no more than a collective name for those species of *Neolaparus* in which the males have developed such sexual ornamentation : compare, for example, the genus *Dolichopus*?

The collection from the P.N. Garamba contains only a single specimen, which cannot be referred to any known species.

Lagodias griseus sp. n.

Distinguished from most of the known species of *Lagodias* by the fact that the scales of the middle and hind legs completely cover the tarsi and the tibiae, but there are none on the femora. There is at least one other unidentified species with this type of ornamentation, but the present species is unique in having the thorax almost entirely dusted with white, and only indistinctly darker paired longitudinal stripes are visible. Wings nearly white, with pale veins.

♂ *Head.* Shaped as in those species of *Neolaparus* that have a broad front, and have facial hairs in addition to the two strong bristles. Fronto-facial area almost as broad as one eye, scarcely narrowed at antennae. Evenly covered with white tomentum, and with white hairs. Two strong, white bristles on epistoma, and many white hairs forming a moustache, but not extending more than half-way to antennae. Proboscis and palpi black with mainly black hairs. Antennae blackish, with pale constrictions between the segments, and at base of third segment : hairs long, white ventrally, shorter and black dorsally. Occiput uniformly covered with white tomentum, and with numerous silvery white hairs, among which the pair of white postverticals are almost lost.

Thorax black, with a thick covering of white tomentum, with no pattern except for a paired longitudinal stripe which appears blackish because the tomentum is thinner there. Abundant very fine white hairs curled upwards (compare *Pegesimallus*). Strong bristles are 1 notopleural, 1 supra-alar, and 1 postalar. Scutellum with erect, soft, white hairs all over disc, but no strong bristles.

Abdomen. Dorsum shining black, with a purplish sheen. White tomentum covers first tergite, and surrounds bulla on second, as well as forming a pair of prominent white spots of segments 2–6. Venter shining black with yellow segmentations. Genitalia black, epandrium reddish.

Legs. Elongate and slender, femora and tibiae swelling to a knob at apex. Femora and tibiae yellow basally, otherwise legs red-brown or dark brown. Fore legs without ornamentation. Middle and hind legs each with no scales on femora, and with a broad, conspicuous, double fringe of dense black-brown scales, which continue without diminution to apex of fifth tarsal segment. Normal vestiture of short black clothing hairs and white stiff bristles present on all legs.

Wings. Hyaline, very pale yellowish and iridescent clear membrane, no microtrichiae except at extreme tip of wing.

Length of body 15 mm ; of wing 13 mm.

Holotype ♂. Garamba National Park : P.N.G., 1514, II/gg/8, 10.iv.1951 (IPNC).

Paratype ♂. Ituri : Mongabi, près Faradje, 4.iv.1930 (*Collart*) (MRAC).

PEGESIMALLUS Loew

Pegesimallus Loew, 1857 : 344 ; 1860 : 69. Type-species : *Pegesimallus ursinus* Loew, monotypic.

As stated above, *Pegesimallus* is closely related to *Neolaparus*, and only to be distinguished by being covered with abundant, rather long, soft hairs. Hull's claim that *Pegesimallus*, like *Neolaparus*, has the small, compact hair-tuft on the hypopleuron, whereas *Lagodias* has not, is apparently not valid. The present specimen has no such tuft, although in proportions of body and head, as well as in general hairiness, its affinities clearly lie with *Pegesimallus ursinus* rather than with the stark, bare flies that are typical of *Neolaparus*.

Three species have been described in *Pegesimallus*, all from southern Africa. The present species differs from all of these in the much greater length and density of the hairs clothing the hind leg (Text-fig. 37). *Neolaparus morio* Bezzi from West Africa, and one or two undescribed allied species, ought perhaps to be transferred to *Pegesimallus*, if this genus is to be maintained at all.

***Pegesimallus saegeri* sp. n.**

(Text-fig. 37)

A dull black, or black-brown species, with brown antennae and legs. Middle and hind legs exceptionally hairy, but not scaly as in *Lagodias*, hairs longer and denser than in any other species.

♂ *Head.* Fronto-facial area parallel-sided, about two-thirds as broad as one eye. Antennae at upper third. Frons black, with thin brown tomentum. A row of black hairs on each side runs from vertex and crosses diagonally to base of each antenna. Face produced at epistoma about as far as length of palpi, but with a flat profile, no facial hump (compare *Lycostomus*). Covered with dense brown-grey tomentum. Moustache black, composed of two strong bristles and a mass of black hairs, which does not quite extend up to antennae. Palpi cylindrical, or very slightly thickened at tip, first segment tiny and inconspicuous ; black, with very long black hairs. Proboscis black. Antennae chestnut-brown ; first two segments subequal ; third constricted basally, slightly clavate, microsegment at tip almost undetectable, with a small apical spine ; hairs and bristles black, third segment with a number of short black bristles dorsally and externally. Occiput with brown tomentum and a mass of fine black hairs, a pair of strong black postvertical bristles, and one or two others concealed among the fine hairs.

Thorax. Mesonotum strongly convex, but in a uniform curve, not projecting anteriorly ; covered with thick, black-brown tomentum, with only faint traces of a pair of median longitudinal stripes, and more reddish on lateral margins. The mane of fine black hairs is less dense than in *Pegesimallus ursinus* Walker, and is confined to the dorsocentral stripes, a large area behind each humeral lobe, and broad lateral margins. Strong black bristles comprise one notopleural, one supra-alar, and one postalar, with some bristly hairs nearby. Scutellum with no bristles, and with a tuft of hairs on each side in line with supra-alars (as in many species of *Neolaparus*). Pleura black-brown, with rather long black hairs on most sclerites, but no trace of a dense little patch on hypopleuron.

Abdomen black, only faintly reddish at sides of first three tergites. Covered with black tomentum, seventh tergite with a pair of large areas of shining black. Hairs both dorsally and ventrally long, dense, and erect. Abdomen a little narrowed basally into a waist, but after fifth segment it is laterally compressed. Male genitalia of similar construction to those of *Neolaparus*, mostly shining black, but epandrium and aedeagus red.

Legs. Long and moderately slender, chestnut-brown. Hind femora a little stouter than in typical *Neolaparus*, but made to appear more so by the long, dense, black hairs, as shown in Text-fig. 37. Bristles few, and scarcely to be distinguished from the surrounding hairs. Middle legs similar, fore legs rather less hairy. Coxae with tomentum and hairs like those of pleura.

Wings. Venation normal, only anal cell closed on wing margin. Alula small, rounded. Membrane stained almost uniformly yellow-brown.

Length of body 15 mm ; of wing 12 mm.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 349, I/o/I, 28.iii.1950 (IPNC).

MICROSTYLUM Macquart

Microstylum Macquart, 1838 : 26. Type-species : *Dasypogon venosum* Wiedemann, 1821, by designation of Back, 1909.

Mimoscolia Enderlein, 1914 : 168. Type-species : *Mimoscolia fafner* Enderlein, 1914, by original designation.

This is another very large and difficult genus, in this respect resembling *Neolaparus*, and equally in need of a thorough revision, taking into consideration all the species throughout the Ethiopian Region. The study of *Microstylum* is further complicated

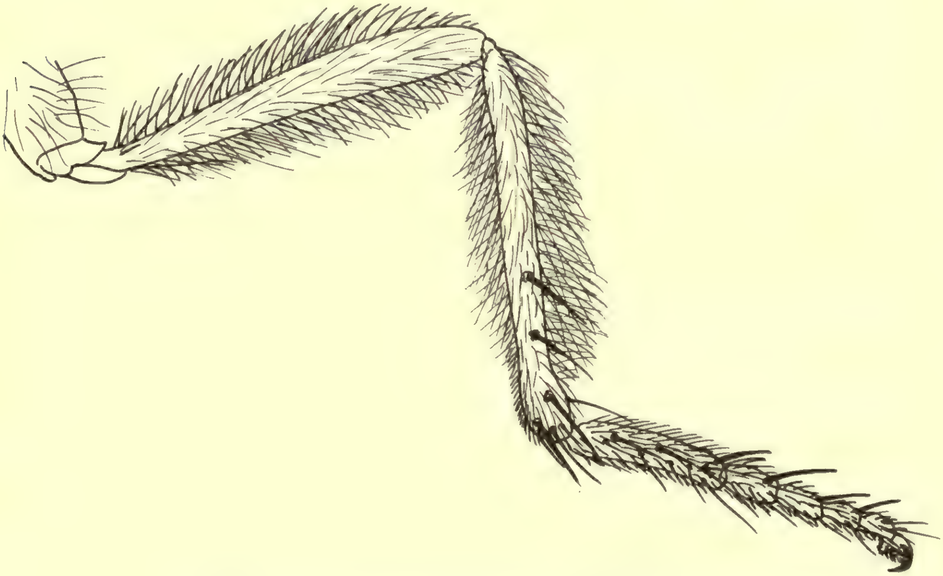


FIG. 37. *Pegesimallus saegeri*. Left hind leg.

by the existence of a large number of species in Madagascar, where they form a striking part of the Asilid fauna. Some species are amongst the biggest flies in the world.

The present collection from the Parc National du Garamba contains only three specimens of *Microstylum*, belonging to two species, both of which have a spur-like prolongation of the tip of the middle tibia (Text-fig. 39). This brings them into *Mimoscolia* Enderlein, which Hull (1962 : 160) regards as a full genus, though other authors have considered it to be at most a subgenus of *Microstylum*. Its status may be even less than that : it is possible that those species with some form of prolongation of the middle tibia are not even a species-group, but merely unrelated species that happen to have this detail in common. This view receives support from the fact that *M. cilipes* Macquart and *M. mydas* Engel, both from Madagascar, have a process of a sort, not on the tibia, but on the basitarsus of the middle leg, perhaps serving a similar practical purpose. Hull (1962) puts *mydas* in *Microstylum* and *cilipes* in *Mimoscolia*, though Engel (1932) puts them into the same couplet of his key.

Bezzi (1908) described two genera from the Congo Basin that are very closely allied to *Microstylum*. *Eclipsis*, monotypic for *maculiventris* Bezzi, is distinguished from *Microstylum* by having the first posterior cell of the wing closed, and the costal vein not extending much beyond R_4; while *Epiblepharis*, monotypic for *pedunculata* Bezzi, has the second posterior cell, of characteristic shape in *Microstylum*, pedunculate rather than sessile on the tip of the discal cell. Hull (1962 : 158, 159) rightly suspects that these may be no more than anomalous species of *Microstylum*. One badly preserved specimen from the Mayumbe, in the collection du Musée du Congo, could be *Epiblepharis pedunculata*, but if this is correctly identified it supports Hull's view, because the second posterior cell is sessile in one wing, and barely pedunculate in the other.

The following key is extremely incomplete, especially in regard to species described by the older authors from the Cape. It is given because it covers most of the species described from the Congo Basin or areas immediately adjacent, and because the existing keys deal mainly or partially with the many *Microstylum* from Madagascar.

KEY TO CENTRAL AFRICAN *MICROSTYLUM*

1 Middle tibia with spur, the tibia itself being prolonged into an acute process (Text-fig. 39) (*Mimoscolia* Enderlein) 2
– Middle tibia sometimes with a comb of spines, or a slightly extended rim, but never with a spur (*Microstylum* s. str.) 4
2 Abdomen black, with white hind margins ; last two or three segments red (♀) or with grey bands becoming more complete from third segment onwards (♂) **helenae** Bezzi, 1914 : 3 (p. 266)
– Abdomen without distinctive cross-bands, and without red tip 3
3 Mesotibial spur claw-like, with several strong spines. Femora black with red tips ; tibiae and tarsi red. Abdomen mainly red, with black base and tip, and white clothing hairs . . . . **braunsi** Bromley, 1932 : 263
– Mesotibial spur conical, with small, globular tip. Legs black or only obscurely reddish. Abdomen black, with ashy grey or brown tomentum **pollex** sp. n. (p. 266)

4	Abdominal tergites with distinct transverse bands	5
–	Abdominal tergites not distinctly banded	6
5	Abdominal tergites black, with grey hind margins ***lituratum*** Loew, 1863 : 10 (***elegans*** Ricardo), 1900 : 168	
–	Abdominal tergites grey with narrow black segmentations . ***hirtipes*** Ricardo, 1925 : 259	
6	Pteropleural bristle present	7
–	Pteropleural bristle absent	16
7	Proboscis abnormally long and slender, much longer than height of eye	8
–	Proboscis sometimes a little longer than height of head, but not conspicuously slender	12
8	Occiput with yellow hairs and bristles, only isolated black ones	9
–	Occiput with bristles predominantly black	10
9	Femora black at base and tip, with red ring in middle . . . unnamed sp. (BMNH)	
–	Fore and middle femora black at base, hind femora red . ***rufum*** Ricardo, 1925 : 254	
10	Scutellum orange . ***nigrescens*** Ricardo, 1900 : 169	
–	Scutellum black	11
11	Legs distinctly red in part . ***acutirostre*** Loew, 1852 : 658	
–	Legs black, or only indistinctly brownish . ***nigrimystaceum*** Ricardo, 1925 : 258	
12	Occipital bristles partly or wholly black	13
–	Occipital bristles all pale	15
13	Wings milky white (? ♂ only). Halteres reddish ***lacteipenne*** Wiedemann, 1821 : 371	
–	Wings dark brown, not milky. Halteres black	14
14	Hind femora as well as hind tibiae covered with white clothing hairs ***ricardoae*** sp. n. (p. 268)	
–	Hind femora and most of hind tibiae with black clothing hairs ; tibiae with white hairs ventrally on basal half . ***nigribarbatum*** Bigot, 1878 : 408	
15	Short hairs covering femora and tibiae uniformly white . ***validum*** Loew, 1857 : 347	
–	Short hairs covering femora and tibiae uniformly black, except for basal half of anterior face of hind tibiae, where hairs are longer and white ***capensis*** Fabricius, 1805 : 154	
16	Face not swollen except on mouth-margin, to which moustache is confined. Coxae with short, stiff bristles or spines, sometimes mixed with fine hairs	17
–	Face swollen into a conspicuous hump, with a dense moustache. Coxae clothed partly or entirely with long, fine hairs, sometimes mixed with a few strong bristles	26
17	Base of wing, posteriorly, milky white, constrating with blackish tip ***pica*** Macquart, 1846 : 59	
–	Base of wing not conspicuously different from rest	18
18	Coxae hairy as well as bristly	19
–	Coxae bristly, with few or no fine hairs	22
19	Scutellar disc with only tiny spines. Legs mainly black	20
–	Scutellar disc with fine hairs. Legs orange	21
20	Proboscis distinctly longer than height of one eye. Male genitalia as in Text-fig. 38 ***sessile*** Bezzi, 1908 : 376 (p. 269)	
–	Proboscis shorter than height of one eye. Male genitalia as in Text-fig. 40 ***attenuatum*** Ricardo, 1925 : 257	
21	Abdomen clothed with short yellow hairs, as well as rust-brown tomentum ***venosum*** Wiedemann, 1821 : 215	
–	Abdomen clothed with rust-brown tomentum, at least on basal segments, but without short hairs . ***capucinum*** Bigot, 1878 : 408	
22	Abdomen predominantly orange	23
–	Abdomen dark	24
23	Thorax and legs chocolate-brown, contrasting with abdomen, which is orange except at extreme base and tip . ***dispar*** Loew, 1858 : 348	

– Thorax ashy grey, heavily tomented. Legs mostly red, femora darker above. Abdomen orange, a little darker at tip, but orange at base **unicolor** Ricardo, 1925 : 256
24 Dorsum of abdomen shining black, with narrow yellow segmentations ; narrow strip of tomentum only along each lateral margin **spinipes** Ricardo, 1925 : 255
– Dorsum of abdomen dull, tomented, at least on first few segments 25
25 Hind margins of anterior abdominal segments very clearly margined in yellow **spurinus** Walker, 1849 : 323
– Hind margins of abdominal segments not, or very indistinctively marked **partitum** Walker ; **parcum** Karsch, 1887 : 373
26 Legs partly reddish or orange ; femora usually with dark stripe 27
– Legs entirely dark brown or black 31
27 Abdomen orange, only extreme base and genitalia black. Hind femora orange with brown tip **fenestratum** Wiedemann, 1828 : 377
– Abdomen darker. All femora with dark stripe 28
28 Abdomen clothed with rather long, pale hairs 29
– Abdomen with sparse and inconspicuous hairs 30
29 Wings heavily stained dark brown. Mesonotum with shaggy hairs in addition to bristles **hermanni** Ricardo, 1925 : 249
– Wings quite clear, hyaline. Mesonotum with strong bristles, and very short hairs only, no shaggy hairs **villosum** Bigot, 1878 : 406
30 Palpi orange **bloesus** Walker, 1849 : 307
– Palpi black, though with some long, pale hairs **varipennatum** Bigot, 1878 : 407
31 Halteres dark, and bristles before them black 32
– Halteres yellow, and bristles before them white **ignobile** Loew ♂, 1857 : 347
rufineurum Macquart ♀, 1855 : 48
32 Wings extensively whitish basally, with dark tip. Abdomen black with white lateral margins. Hairs of occiput, beard and coxae mainly black **ustulatum** Engel & Cuthbertson, 1938 : 133
– Wings almost uniformly brown. Hairs of occiput, beard and coxae mainly white **glabrum** Ricardo, 1900 : 168

Microstylum helenae Bezzi

Microstylum helenae Bezzi, 1914 : 3.

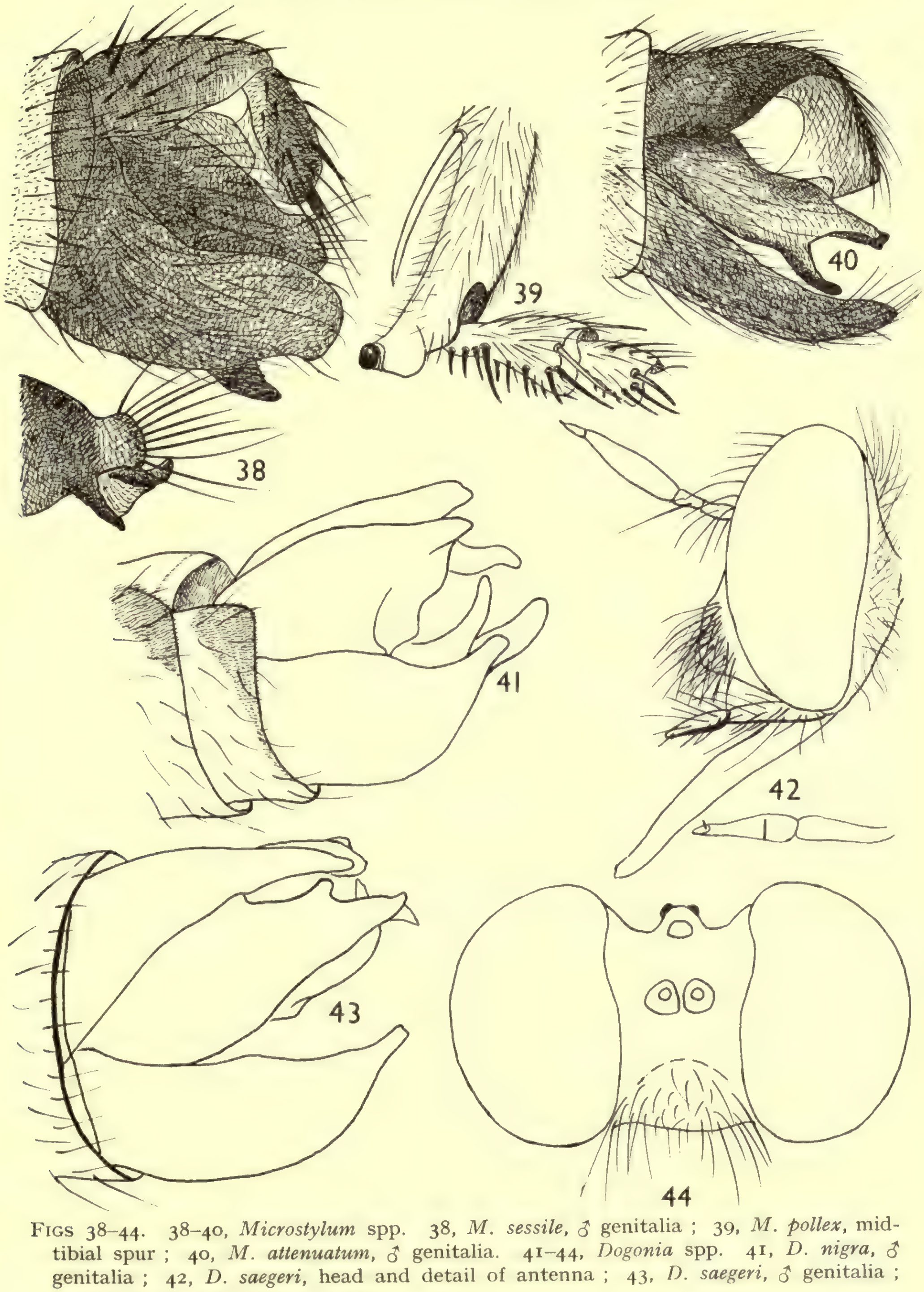
GARAMBA NATIONAL PARK : P.N.G., 331, I/0/1, 1 ♀, 27.iii.1950 (IPNC).
KATANGA : Ngaye, 1 ♂, 1932 (*R. O. Claquin*) (MRAC).

Microstylum pollex sp. n.

(Text-fig. 39)

A species of moderate length (19 mm), rather small for a *Microstylum* ; black, with dark wings, and heavily tomented abdomen. Belongs to the group *Mimoscolia* Enderlein because of its spur to the middle tibiae. Nearly all the known members of this group occur in Madagascar, and apart from the distinctly banded *helenae* (see above), the only mainland species recorded is *braunsi* Engel from the Cape. This differs from *pollex* in the shape of the mid-tibial process, the colour of the legs, and the predominance of black bristles on the head.

♂ *Head* black, with cinereous grown tomentum and white hairs and bristles. Sides of frons with multiple row of white bristly hairs. Face in profile almost straight, and only a little



FIGS 38–44. 38–40, *Microstylum* spp. 38, *M. sessile*, ♂ genitalia ; 39, *M. pollex*, mid-tibial spur ; 40, *M. attenuatum*, ♂ genitalia. 41–44, *Dogonia* spp. 41, *D. nigra*, ♂ genitalia ; 42, *D. saegeri*, head and detail of antenna ; 43, *D. saegeri*, ♂ genitalia ; 44, *D. saegeri*, head from in front.

prominent on mouth-margin ; with brown tomentum and no hairs above moustache, which is dense, entirely white, and confined to epistoma. Palpi black with black hairs ; proboscis black with white hairs beneath base, merging with snow-white beard. Occiput covered with whitish tomentum and white hairs and bristles.

Thorax black, with ashy grey tomentum. Mesonotum more brown in middle, and traces of paired, rather broad, longitudinal stripes, and between them a groove in surface. Tiny clothing hairs black over most of area, but white round margins. Scutellum grey, bare on disc, with two strong marginal bristles, and one or more weaker ones laterad. Pleura ashy grey or blackish, with sparse hairs, mostly black, but white tufts on propleura and all coxae.

Abdomen black. Dorsum with ashy grey tomentum, which is more brown in middle. Short clothing hairs white. Venter grey with white hairs. Genitalia shining black : hairs and bristles strong and white on hypandrium, mostly black on epandrium.

Legs black, knees dull reddish, tibiae and tarsi no more than obscurely reddish. Short clothing hairs nearly all white, some black on femora ; strong bristles of tibiae and tarsi mixed white and black.

Wings uniformly dark brown. Halteres with light brown stalk and darker knob.

Length of body 19 mm ; wing 14 mm.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 331, I/0/1, 27.iii.1950 (IPNC).
Paratype ♂. 3267, Ndelele/K117, 27.iii.1952 (IPNC).

Microstylum ricardoae sp. n.

Long ago, Miss Ricardo set aside two female *Microstylum* in the BMNH collection from Kambove, in the Katanga, as ' ♀ of *nigribarbatum* Bigot, or sp. nov.' In the collection of the Musée du Congo Belge is a series of females of the same species, and one male, clearly conspecific, and all from the vicinity of Elisabethville. It thus becomes apparent that Miss Ricardo's species is not the female of Bigot's, but should be described as new. It is easily distinguished from *nigribarbatum* by having the hind femora and hind tibiae conspicuously clothed with white hairs.

♀ *Head* black, thickly covered with yellowish grey tomentum, more brownish on frons, paler on face. Frons with bristly black hairs in multiple rows along each eye-margin. Face bare except for a dense moustache of stiff bristles which may be either bright yellow or whitish, on a tubercle that occupies lower half of face. Palpi and proboscis black with black hairs. Beard silky, black ; occipital bristles and hairs nearer eye-margins, black ; inner part of occiput with silky white hairs.

Thorax dull black, with rusty brown tomentum and black hairs and bristles. An abundant covering of fine hairs as well as strong bristles at sides of mesonotum and on scutellum (2 strong, 2 sometimes weaker) ; no supra-alars. Pleura also with many fine black bristles, including pteropleuron which, however, has no strong bristles.

Abdomen black, dorsally and ventrally sharply divided into a dull anterior half and a shining posterior half. First four segments entirely obscured by black tomentum, but with short white clothing hairs. Segments 5–8 shining black, bare.

Legs. Black : coxae with dense, long, black hairs, no obvious strong bristles ; rest of legs with predominantly white clothing hairs, especially on hind femur, tibia and basitarsus ; elsewhere with some black hairs and bristles.

Wings uniformly rusty brown. Halteres black.

Length of body 27 mm ; of wing 21 mm.

♂ very similar, except that all the abdominal segments are dull, without a shining black tip.

Holotype ♀. KATANGA : 150–200 m. W. of Kambove, 3500–4000 ft, 17.x–1.xi.07 (Neave Coll : BM 1907–230) (BMNH).

Paratypes. Same data as holotype, 1 ♀ (BMNH) ; KATANGA : Elisabethville, 1 ♂, 2 ♀ (*Miss. Agric.*) ; Lumbashi, 3 ♀, 11.x.28 (*Ch. Seydel*) ; Elisabethville, 1 ♀, 12.xi.1923 (*Ch. Seydel*) (MRAC).

Microstylum sessile Bezzi

Microstylum sessile Bezzi, 1908 : 376.

BAS-CONGO : Kisantu, 1 ♂, 1927 (*R. P. Vanderyst*) ; Congo da Lemba, 1 ♂, 1 ♀, 1912 (*R. Mayné*) ; Lemfu, 1 ♀, xii.1945 (*Rév. P. L. de Beier*) ; Boma, 1 ♀ (*R. F. Achille*) ; Banana, 1 ♂, xi.1934 (*P. Henrard*) (MRAC).

DOGONIA **gen. n.**

Type-species : *Dogonia saegeri* sp. n., by present designation.

Related to *Scylaticus* Loew and to *Cyrtopogon africanus* Ricardo, but easily distinguished from both by having the metanotal callosities hairy. Hull's key (1962 : 119) to his tribe *Stenopogonini* recognizes only seven genera of this tribe that have hairy metanotal callosities, and three of these belong to *Microstylum sensu lat.* In Hull's key the new genus runs down to *Neodysmachus* Ricardo, but is quite different in appearance from that elongate, bristly, Australian genus. In general appearance *Dogonia* looks like a *Saropogon*, but without the fore tibial spurs.

Head (Text-figs 42, 44). In profile eyes shallow, occiput conical, exposing a large surface, which has long, fine hairs but no stiff bristles. Seen from in front, face is parallel-sided, almost one quarter of head-width ; eye-margins excavate above antennae (Text-fig. 44). Ocellar tubercle large, but sunk below level of vertex. Antennae with two rather short, subequal segments, then an awl-shaped third segment, ending in a short, conical, microsegment, and a distinct apical style. Face gently convex in upper half, lower half expending smoothly into a distinct knob ; moustache confined to this knob. Palpi two-segmented, little longer than epistoma ; both segments subequal, second a little swollen basally, narrowed apically, with apical pit and style. Proboscis as long as height of eye.

Thorax not structurally remarkable.

Abdomen. Depressed cylindrical, tapering a little apically, like that of *Saropogon*. Bare, shining, with narrow band of tomentum on extreme lateral margins only. Male genitalia compact, with pointed lobes, rotated through about 90° anticlockwise. Female with rather long, slender acanthophorites.

Legs. No spurs on tibiae, and no other structural peculiarities. Femora and tibiae slightly swollen in one species, less so in other.

Wings. Of primitive shape : i.e. broad, with costal cell broad, and all cells open on wing-margin, including anal.

Dogonia saegeri **sp. n.**

(Text-figs 42–44)

A rather small species, with dark head, thorax and wings, red abdomen and legs. It differs from the following species, *D. nigra* sp. n. in coloration and in the male genitalia. (Text-figs 41, 43).

♂ *Head.* Black. Frons and face with dense yellowish tomentum. Frons with multiple row of bristly hairs along eye-margins, and another row leading from each antenna to ocellar tubercle : mostly pale yellowish, a few brownish or black ; ocellar tubercle with two or three pairs, some black. Face similar, but with no hairs dorsal to facial tubercle ; all hairs and bristles concentrated into a moustache, which is confined to facial tubercle, and almost entirely pale yellowish or white, with only one or two black ones. Palpi black with black hairs. Proboscis black or mahogany-red, with yellow hairs. Antennae black, with pale yellowish hairs. Occiput black with whitish tomentum and silky whitish hairs, no strong bristles.

Thorax. Ground colour black with some reddish areas, notably humeri, postalar calli and posterior parts of pleura. Covered with brown tomentum, yellow laterally. Pronotum with long, fine yellowish hairs, and no strong bristles. Mesonotum clothed uniformly and fairly densely with black hairs, which are slightly longer than first antennal segment. Scutellum with no true apical bristles ; with fine discal bristles and a submarginal row of 6–8 longer, erect. Pleura patchily black and red, covered with dense yellowish tomentum except for a large area of shining black on mesopleuron. Pleural tufts of hairs pale yellowish, except those before halteres, which may be partly black.

Abdomen bright orange : dorsum bare and shining, except for a narrow strip of whitish tomentum along each side. Face black, rather long, clothing hairs distributed over entire dorsum. Male genitalia (Text-fig. 43) red with black tips, and with long black hairs.

Legs. Coxae like pleura, with whitish hairs. Rest of legs mahogany-brown or irregularly blackish, with black bristles, and clothing hairs that are uniformly whitish. Pulvilli light brown ; claws black, reddish at base.

Wings dark brown, with purple reflections, and perhaps with clearer centres to some cells Halteres yellow.

Length of body 12 mm ; of wing 9 mm.

♀ closely similar.

Holotype ♂. Garamba National Park. P.N.G., 327, Akam, 24.iii.1950 (IPNC).

Paratypes. Same data as holotype, 1 ♀ (IPNC) ; 305, Mt. Ndogo, 1 ♂, 3 ♀, 15.iii.1950 ; 3262, II/fc/18, 1 ♀, 31.iii.52 (IPNC).

Dogonia nigra sp. n.

(Text-fig. 41)

Distinguished from *D. saegeri* by its black colour, and by the different shape of the male terminalia (Text-figs 41, 43).

♂ *Head* black, with dense white tomentum, a little brownish on vertex. Bristles a little stronger, perhaps, than in *saegeri*, in some rows on frons, along eye-margins, and from antennae to ocelli ; mostly pale yellowish, but with isolated black ones. Moustache confined to facial knob, composed of white bristles with a single black one at each side. Palpi and proboscis black with yellow-brown and black hairs. First antennal segment black, second and third dark reddish ; first two segments with yellowish hairs. Occiput with white tomentum and silky white hairs.

Thorax. Pronotum speckled brown-grey, with fine, pale yellowish hairs. Mesonotum with thick tomentum, black-brown in two longitudinal stripes and paired lateral spots, yellowish in between ; entirely clothed with rather long black, bristly hairs, individually spaced, and hardly to be distinguished from the thicker bristles. Scutellum ashy dark grey, with sparse, curved clothing hairs, and with 4–6 submarginal bristles, curved upwards, and the middle pair even crossed. Pleura black, with ashy yellowish grey tomentum, leaving bare a large, shining black patch on mesopleuron. Hairs mostly pale, but with some black bristly hairs on mesopleuron.

Abdomen. Dorsum shining black-brown ; entire first segment, side-margins of rest, and a narrow hind margin of seventh tergite with grey tomentum. Venter shining black-brown.

Male genitalia generally similar to those of *saegeri*, but differing in detail as shown in Text-figs 41, 43.

Legs. Coxae like pleura, with ashy yellowish tomentum and pale hairs. Rest of legs shining black-brown, with hairs and bristles partly white, partly black. Pulvilli brown, claws brown at base, black at tips.

Wings dark brown with distinctly paler centres to most cells. Halteres yellow.

Length of body 10 mm ; of wing 7 mm.

Holotype ♂. Garamba National Park : P.N.G., I/a/1, 13.iii.1950 (IPNC).

ANCYLORRHYNCHUS Berthold

Ancylorrhynchus Berthold in Latreille, 1827 : 498. Type-species : *Asilus glaucius* Rossi, 1790, monotypic.

Xiphocera Macquart, 1834 : 279. Type-species : *Xiphocera percheroni* Macquart, 1834, original designation.

Enchocera Blanchard, 1845 : 463. No included species ; recognizable because published as synonym of *Xiphocera* Macquart.

Opegiocera Rondani, 1845 : 153. [*Nomen nudum*].

Elasmocera Rondani, 1845 : 153. Type-species : *Elasmocera cingulata* Rondani, 1845, monotypic.

This distinctive genus is easily recognized by the most peculiar shape of the proboscis (Text-figs 44–48), short, pointed, backwardly curved, and when seen in profile, resembling a comma, or a parrot's beak. The genus occurs in the Palaearctic, Ethiopian and Oriental Regions, and is remarkably constant in general characters which, except for the proboscis, are close to those of *Scylaticus* (q.v.).

It seems evident that the characteristic proboscis must be related to some peculiarity of diet, but as far as I know no-one has attempted to speculate what it might feed upon. Some observations on this proboscis will be the subject of a separate small paper.

At least 22 species of *Ancylorrhynchus* exist in the Ethiopian Region, but only *A. crux* Bezzi is recorded from the Congo Basin, and that from an unknown locality. The collections from the P. N. du Garamba contain no *Ancylorrhynchus* ; M. François collected *A. crux* and an undescribed species from Urundi.

Key to the Species of *ANCYLORRHYNCHUS* in the Ethiopian Region

1	Fourth posterior cell closed, with or without stalk	2
–	Fourth posterior cell open, even if narrowed	5
2	Wings entirely dark	***funebris*** Bromley, 1936 : 135
–	Wings pale in part	3
3	Legs entirely black	***susurrus*** Karsch, 1879 : 380
–	Legs entirely reddish	4
4	Mesonotum red with a black cross. Ground colour of face yellow	***cruciger*** Loew, 1857 : 348
–	Mesonotum almost entirely black, with red only on humeri, postalar calli and hind margin of scutellum	***nyukinus*** Speiser, 1910 : 89
5	Wings entirely pale	6
–	Wings at least partly dark, or uniformly but irregularly smoky	7
6	Mesonotum red, with a thin black median line ; scutellum red with median black spot. Halteres black	***pretoriensis*** Bromley, 1836 : 135

– Mesonotum black, with red colour on humeri, and posteriorly ; scutellum red with black base. Halteres tawny yellow . . . ***maculatus*** Bigot, 1878 : 428

7 Legs entirely black. Wings indistinctly bicoloured . . . 8

– Legs not entirely black. Wings distinctly bicoloured, or entirely dark, or irregularly smoky without definite paler areas . . . 9

8 Moustache pale. Scutellum black . . . ***nomada*** Wiedemann, 1828 : 297

– Moustache black. Scutellum black, reddish at sides . ***unifasciatus*** Loew, 1857 : 349

9 Wings entirely dark, or uniformly smoky grey . . . 10

– Wings bicoloured . . . 13

10 Abdomen black with sharply defined yellow (not red) hind margins, sometimes broken into a pair of spots ; second segment with a broad band of white tomentum, interrupted in middle . . . ***zonalis*** Bromley, 1936 : 137

– Abdomen without sharply defined bone-yellow bands . . . 11

11 Moustache pale . . . 12

– Moustache black . . . ***munroi*** Bromley, 1936 : 135

12 Antennae and humeri reddish. Abdomen shining black dorsally, reddish ventrally ***humeralis*** Wiedemann, 1821 : 235

– Antennae and humeri black. Abdomen bright red, except for black first segment (an unnamed sp. from S. Africa)

13 Legs bicoloured . . . 14

– Legs entirely reddish . . . 16

14 Moustache entirely black . . . ***quadrimaculatus*** Loew, 1857 : 348

– Moustache entirely or predominantly pale . . . 15

15 Scutellum black . . . ***variegatus*** Bigot, 1878 : 429

– Scutellum partly red. Thorax with brown tomentum, unusual in this genus. Hind femora red with longitudinal black stripe . . ***striatus*** sp. n. (p. 274)

16 Scutellum entirely reddish or tawny, Wings light brown, with costal border yellow. Second abdominal segment with a pair of large grey patches . . . 17

– Scutellum partly black, usually at base . . . 18

17 Lateral borders of mesonotum black from behind humeri to transverse suture. Abdomen black, posterior segments with orange hind margins, expanded laterally. Palpi with black or brown hairs . . . ***braunsi*** Bromley, 1936 : 136

– Lateral borders of mesonotum broadly red. Abdominal segments 1–4 black, with narrow red hind margin ; fifth segment much brighter red. Palpi with red hairs (*tricolor* Loew = either *braunsi* or *reynaudii*) ***reynaudii*** Macquart, 1838 : 48

18 Yellow base and brown tip of wings sharply divided . . . 19

– Yellow and brown indistinctly merging, or dark area of indefinite extent, even if contrasting in colour with yellow base . . . 21

19 Abdomen entirely black, segments 2–5 grey dusted. Large, robust species (25 mm) Pteropleuron red. Dark tip of wing including half of total area, and entire discal cell . . . ***magnificus*** Bromley, 1936 : 136

– Abdomen dull orange, first segment and base of second black, with other black markings. Smaller (15 mm) . . . 20

20 First abdominal segment entirely black. Pteropleuron black

apicalis Curran, 1934 : 7 }
splendens Bromley, 1936 : 137 } no difference in descriptions

– First abdominal segment partly red. Pteropleuron reddish

Two species recognized by Hermann but apparently undescribed

21 Mesonotum mostly black, red colour confined to humeri, postalar calli, and apex of scutellum. Abdomen black, all segments broadly margined with reddish colour ***fulvicollis*** Bigot, 1878 : 429

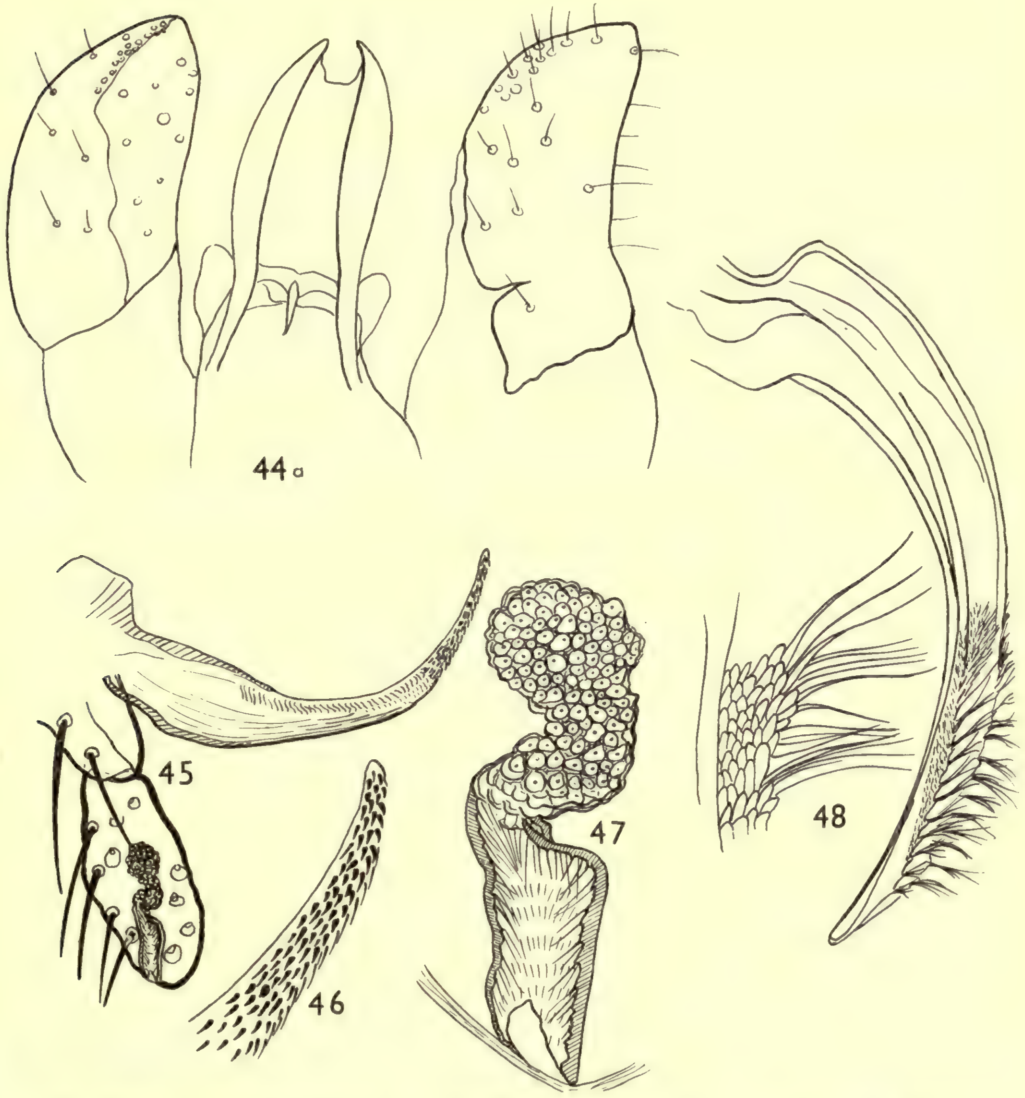
– Mesonotum mainly red, with a black cross . . . 22

22 Hypopleuron distinctly red . . . ***insignis*** Bromley, 1936 : 137

– Hypopleuron black, or only indistinctly reddish . . . 23

23 Fourth posterior cell wide open. Lateral arms of mesonotal black cross triangular. Abdominal segments 2–5 silky yellow, with narrow, interrupted median black stripe . . . . ***crux*** Bezzi, 1908 : 377 (p. 274)

– Fourth posterior cell only narrowly open. Lateral arms of mesonotal cross quadrate ***hylaeformis*** Speiser, 1910 : 88



FIGS 44a–48. *Ancylorrhynchus* sp., proboscis. 44a, labium, showing dorsal groove ; 45, maxilla, with palp ; 46, tip of maxilla ; 47, glandular organ of palp ; 48, hypopharynx, with detail.

Ancylorrhynchus crux Bezzi

Ancylorrhynchus crux Bezzi, 1908 : 377.

URUNDI : Terr. de Bururi, 1 ♀, 19.v.1952, colline Rumonge, loc. Imbo., alt. 780 m ; Rumonga, sable et brousailles près du rive du Lac Tanganika, alt. 790 m, 1 ♀, 19–20.vi.1948 (FJF).

***Ancylorrhynchus striatus* sp. n.**

One of the rather few species of *Ancylorrhynchus* to have bicoloured legs, this species is distinct from all others in having a narrow black longitudinal stripe on all the femora, which are otherwise red.

♀ *Head* in ground colour black, covered with dense yellow tomentum, leaving only a small bare spot beneath the antennae, and one on each side of mouth-margin. Hairs of frons and face pale yellow, including a shallow moustache on mouth-margin, linked with tracts of longer hairs on each side of face. Hairs and bristles of occiput and beard, in contrast, deep red, bristles strong and dense. Antennae red, third segment with blackish stripes, first two segments with yellow hairs and bristles. Palpi reddish with black bristles. Proboscis red.

Thorax. Pronotum red anteriorly, black posteriorly and laterally. Mesonotum red, with usual cruciform black markings, its transepts triangular, and a distinct brown median line ; behind each humerus a barrow black crescent ; scutellum red with a transverse black basal band ; bristles yellow, 4 notopleurals, 3 postalars. Entire dorsum covered with a white, powdery dusting, which greatly obscures the pattern. Pleura entirely black with brown tomentum, except for a reddish area beneath hind spiracles and halteres.

Abdomen. First six segments black, each becoming more reddish posteriorly, and with a narrow red hind margin. Thick brown or yellowish brown tomentum, and numerous pale yellow clothing hairs, but no strong bristles. Last two segments and terminalia orange, with orange spines.

Legs. Coxae like pleura. Legs otherwise red, femora each with a narrow black stripe along dorsal surface. Bristles yellow, becoming black on fore tibiae.

Wing. All cells open on margin, including anal (narrowly). From anterior cross-vein to wing-tip is brown, and a further brown band runs across base of discal cell. Halteres bright yellow.

Length of body 16 mm ; of wing 12 mm.

Holotype ♀. URUNDI : Nyamibu, Lac Tanganika, 24.vi.1949 (FJF).

Paratype ♀. Same data as holotype (FJF).

SCYLATICUS Loew

Scylaticus Loew, 1858 : 346, 349. Type-species : *Scylaticus zonatus* Loew, by designation of Engel, 1929 : 369.

A genus of distinctive flies, bristly, with rounded head and inflated occiput. Obviously closely related to *Ancylorrhynchus*, but having a straight, acute proboscis of normal type instead of the characteristic beak-like proboscis of *Ancylorrhynchus*. The third antennal segment, too, is different.

Scylaticus is a genus of rather arid places, and in the Ethiopian Region the species are known from South Africa as far north as Nyasaland. Other species occur in the Sahara and the eastern Mediterranean, as well as in India and in S. America. It seems likely that the two populations in North and South Africa may be linked through Kenya and Tanzania.

There are no specimens of *Scylaticus* in the collections from the P. N. du Garamba, and only three specimens, all different, from the Katanga. These will be left for future consideration, along with the S. African species. Engel (1932 : 276) published a key to those species known to him.

GONIOSCELIS Schiner

Gonioscelis Schiner, 1866 : 670. Type-species : *Dasypogon hispidus* Wiedemann, 1819, by original designation.

A very distinctive genus, generally resembling a small *Stenopogon* but recognized at once, in both sexes, by the characteristic development of the fore femora (Text-fig. 49). This is obviously a highly efficient apparatus for seizing and holding prey. The proboscis, though short, is stiff, acutely pointed, and slightly curved. The eyes are close together, as in *Stenopogon*, and there is the same dusty, bristly appearance and sandy colouring, appropriate to hunting in scrubby, arid areas.

There are no *Gonioscelis* in the collection from the P. N. du Garamba, but species occur in Urundi and in the Congo Basin.

Gonioscelis maculipennis Engel

Gonioscelis maculipennis Engel, 1925 : 169.

TANGANIKA : Albertville, 1 ♀, 1–20.ii.1919 (*R. Mayné*) (MRAC). Provisionally assigned to this species, as its sex and condition make it impossible to identify with more certainty.

***Gonioscelis occipitalis* sp. n.**

(Text-fig. 49)

A red-legged species, with dull ashy grey-brown abdomen, distinguished from related species by the white-tomented occiput, with black triangles and entirely black, proclinate bristles.

♀ *Head*. Even more strongly compressed than is usual in this genus, frons and upper part of face forming a parallel-sided strip scarcely broader than the two antennae together. Frons black, with bronze tomentum, and with proclinate hairs on each side, just above antennae. Upper part of face, above facial hump, similar, with a band of strong black bristles medially ; facial hump only moderately prominent, covered with white tomentum except at extreme lower angles, where there is a bare, black spot on each side. Moustache mainly of strong black bristles, with white ones on mouth-margin. Occiput covered with white tomentum, except for a pair of large, shining black, bare triangles just behind vertex. From these triangles arise very strong, proclinate, black bristles, with finer black bristles surrounding them, and a single row of straight black bristles parallel to eye-margin, but some distance behind it. Beard yellowish white ; palpi and proboscis black with black and white hairs. Antennae with first two segments blackish with black hairs (rest missing).

Thorax. Mesonotum ashy, more black-bronze anteriorly, more whitish posteriorly. Clothed with very short black bristles and also with 3 pairs of dorsocentrals, 3–4 notopleurals, 3 supra-alars, all black ; 2–3 strong yellow postalars. Marginal scutellars black, one strong pair and one weaker. Pleura with no strong hairs or bristles.

Abdomen dully shining black-brown through thin ashy grey tomentum, and covered with short, stiff black bristles, with longer tufts at sides of first and second segments. Segments 7, 8 shining reddish brown and forming part of ovipositor. Venter similar.

Legs. Coxae like pleura. Fore and middle coxae with strong white bristles, third with a few black bristles. Fore femora black basally on anterior surface ; mid femora a little so ; legs otherwise reddish yellow, even to tips of tarsi. Short clothing hairs white, bristles black.

Wings uniformly smoky brown. Halteres reddish.

Length of body 13 mm ; of wing 10 mm.

Holotype ♀. LULUA : Sandoa à Kapanga, ix.1928 (*Dr. Walker*) (MRAC).

Gonioscelis tomentosus sp. n.

A black, dark-winged species, in general appearance resembling only *G. nigripennis* Ricardo, but distinguished from that species by having the thorax not shining black, but covered with tomentum, that of the pleura especially being dull bronze. From *G. lacertosus* Engel, which also has dark wings, *G. tomentosus* is distinguished by the leg-colour, the legs of *lacertosus* being almost entirely orange.

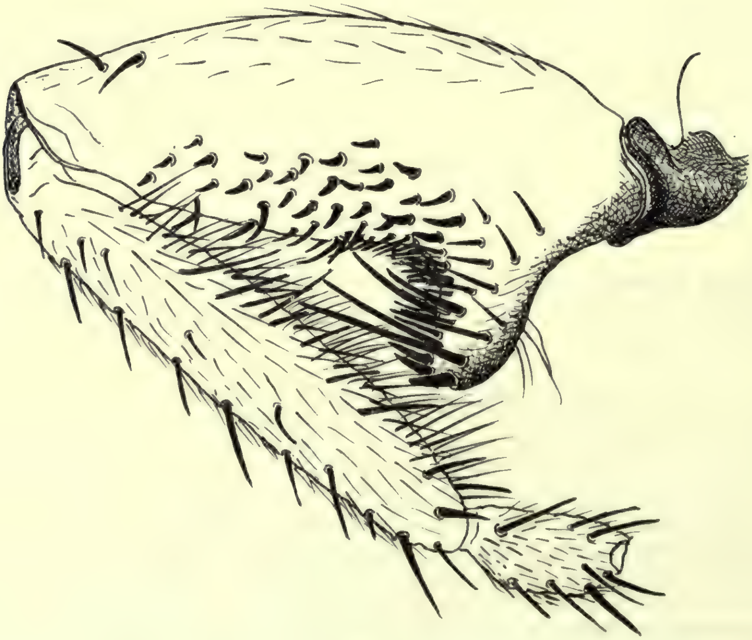


FIG. 49. *Gonioscelis occipitalis*, fore femur.

♀ *Head* black, except for conspicuously orange third segment of antenna. Frons and face very narrow, touching bases of antennae and ocellar tubercle, covered with golden tomentum, a little bare in centre of face and on buccae, with black hairs and bristles. No hairs or bristles on frons except on ocellar tubercle. Moustache entirely black, or with one or two white bristles ventrally, mounted on a slight facial tubercle, which merges gradually with upper face. Vertex narrow, rather flat, with no bare areas, and with black and yellow bristles not in an orderly arrangement. Antennae black basally, with black hairs, third segment and part of second red.

Thorax. Ground colour black, with orange humeri and dull reddish lateral margins, including postalar calli. A dull bronze tomentum exposes a darker pattern of a divided broad median stripe and lateral spots. Mesonotum clothed with short, spiky black bristles; longer bristles may be black or dull red, latter especially laterally ; three pairs of strong postsutural dorsocentrals with one or two feeble pairs anteriorly. Scutellum black, with one pair of black marginal bristles. Pleura uniformly covered with bronze tomentum, without dark areas or other pattern.

Abdomen red-black, or mahogany coloured, with base of first segment and hind margins of others a lighter red ; dully shining through thin grey tomentum which becomes visible in certain directions of the light. Clothing hairs short, erect, black, with longer tufts at sides of first and second tergites.

Legs. Fore coxae with bare, shining black streak posteriorly, and a smaller spot anterobasally. Trochanters black, legs otherwise red, with fore and middle femora extensively black anteriorly on basal half ; hind femora and posterior face of middle femora obscurely darker.

Wings dark brown, with clearer centres in some cells. Halteres red.

Length of body 15 mm ; of wing 10 mm.

Holotype ♀. LULUA : Kapanga, viii.1932 (*F. G. Overlaet*) (MRAC).

Paratype ♀. KATANGA : Fokele, 29.xi.1911 (*Dr. Bequaert*) (MRAC).

***Gonioscelis congoensis* sp. n.**

(Text-figs 50a, 50b)

This species is described, in spite of the poor condition of the available material, because it is confusingly close to *genitalis* Ricardo, from South Africa. The two species may be distinguished by the male genitalia (Text-figs 50a, 50b).

♂ *Head*. Frons and face very narrow, hardly diverging towards mouth-margin. Ground colour black, covered with tawny tomentum and tawny hairs and bristles. Ocellar tubercle with a few black bristles. Moustache entirely tawny. Antennae black basally, with tawny hairs, becoming more reddish apically (third segment broken off in 2 ♂ available). Proboscis and palpi black with yellowish hairs. Occipital hairs and bristles entirely tawny.

Thorax mostly red, with broad, divided median black stripe and large lateral black spots ; scutellum black. This pattern mostly obscured by brassy yellow tomentum. Bristles long, tawny, dorsocentrals postsutural only. Pleura uniformly covered with dense, brown tomentum.

Abdomen dully shining through ashy tomentum, which leaves segmentations yellow : seventh and eighth segment more shining. Clothing hairs short, tawny ; venter similar. Male genitalia as in Text-fig. 50a.

Legs predominantly red, but with femora black (specimens badly preserved). Fore and middle femora not marked with a strong black stripe as in *genitalis* Ricardo.

Wings almost uniformly brown, a little darker in marginal cell.

Length of body 15 mm ; of wing 10 mm.

♀ Similar. Third antennal segment reddish. Seventh and eighth segments incorporated in ovipositor.

Holotype ♂. LULUA : Luluaborg, 21.v.1939 (*J. J. Deheyn*) (MRAC).

Paratypes. LULUA : Luluaborg, 1 ♂, 18.v.1912 (*P. Callewaert*) ; Wombali, 1 ♀, vi.1913 (*P. Vanderijst*) ; Manyema, 1 ♀ (*R. Mayné*) ; Bolobo, Makamandulu, 1 ♀, 1938 (*Dr. Schouteden*) (MRAC).

Gonioscelis francoisi sp. n.

(Text-fig. 51)

Distinguished from the other species of *Gonioscelis* in the Congo Basin by the fact that the dorsocentral bristles extend forwards in front of the transverse suture of the thorax ; hairs of the head predominantly black, and hind femora slender and black.

♂ *Head.* Narrow, frons about twice as broad as ocellar tubercle, covered with yellowish tomentum and with a row of black hairs along each eye-margin. Face diverging little above

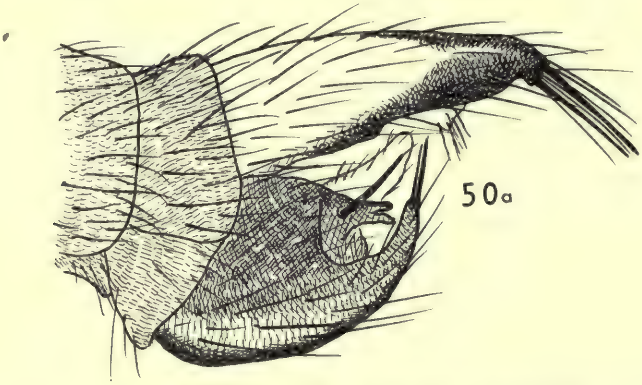


FIG. 50a. *Gonioscelis congoensis*, ♂ genitalia.

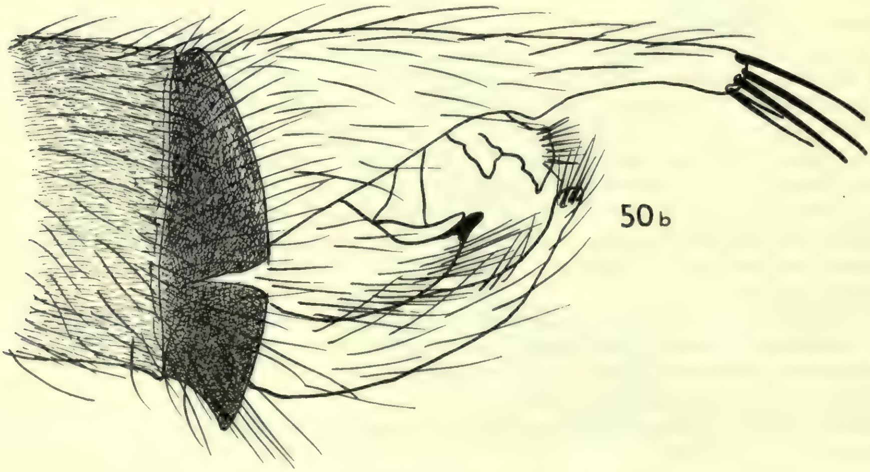


FIG. 50b. *Gonioscelis genitalis*, ♂ genitalia.

facial knob, and then sharply down to mouth-margin ; facial knob slight, with moustache usually entirely black, sometimes pale ; above it, reaching nearly up to bases of antennae, are other black hairs ; lower ones shorter and more bristly, a tuft beneath antennae longer, prominent, and rather silky. Occiput with yellow tomentum and two large, diamond-shaped, shining black patches (cf. *occipitalis* sp. n.) ; occipital bristles mixed black and yellow, a multiserial row some distance behind eye-margin. Antennae, proboscis and palpi black, with black hairs.

Thorax black with brassy yellow tomentum. Mesonotum without pattern, though with faint indications of a median stripe. Covered with very short black bristles ; 5 pairs of long, strong black supra-alars ; a notopleural supra-alar row of 4–5 black ; 2 postalars, yellow or black. Scutellum with one pair of black bristles slightly before posterior margin. Pleura with brassy tomentum and no long hairs.

Abdomen. Dorsum black, with yellowish grey tomentum, posterior margins of segments darker, at least medially ; seventh and eighth tergites more shining blackish. Clothing hairs short, yellow ; longer tufts on first and second segments black. Venter shining black, with short yellow hairs. Male genitalia red, short, as in Text-fig. 51.

Legs. Fore and middle coxae with black hairs, hind coxae with yellow hairs. Femora mainly black ; fore and middle femora red posteriorly and apically, hind femora long, slender, and entirely black. Tibiae and tarsi reddish, obscurely darkened, especially on posterior faces of tibiae. Clothing hairs yellow, bristles mostly black.

Wings. Dark brown with paler centres to many cells, especially to first basal cell.

Length of body 13 mm ; of wing 9 mm.

♀. Quite similar. Ovipositor includes tergites 8, 7 and most of 6.

Holotype ♂. URUNDI : Kisenyi, Busoni, 1800 m, 17.xii.1950 (*F. J. François*) (FJF).

Paratypes. Same data as holotype, 1 ♀.

A ♂ paratype from URUNDI, Kitega, 1700 m, 21.x.1950 (*F. J. François*) has the fore and middle femora less heavily darkened. A ♀ paratype from Kitega, 1720 m, 1.xii.1950 has the colouring of the preceding female, but with the moustache entirely white. There is evidently some degree of variation in this species.

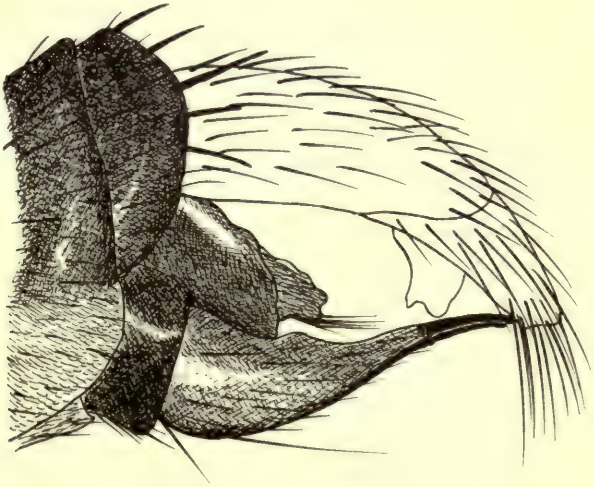


FIG. 51. *Gonioscelis francoisi*, ♂ genitalia.

RHABDOGASTER Loew

Rhabdogaster Loew, 1858 : 346, 351 ; Engel, 1929 : 168. Type-species : *Rhabdogaster nudus* Loew, monotypic.

Described both by Loew and by Engel as resembling a *Leptogaster*, but with complete pulvilli, and with acanthophorites in the female. The male genitalia are of a rather distinctive structure, with the epandrium divided into two large lobes, and with long, curved aedeagus (Text-fig. 52). Posterior to the hind coxae, beneath the base of the abdomen, is a heavily sclerotized arch instead of the usual membranous area : according to Hull's key (1962 : 119) this character distinguishes *Rhabdogaster* from related genera.

Two of the known species of *Rhabdogaster*—*nudus* Loew (1858) and *maculipennis* Engel (1929)—are both small or very small (7–8 mm), delicate flies, pale yellow in colour. The new species is larger than this (10 mm), and shining black, and so is close to *nitidus* Hull (1967), from S.W. Africa, which I have not seen.

Rhabdogaster major **sp. n.**

(Text-fig. 52)

♂ *Head* in front view relatively broad, but not as broad as that of *Xenomyza* : breadth of frons : height of frons + face = 2 : 1 instead of 2·5 : 1. Frons and face parallel-sided, more than half as broad as an eye ; shining black in ground colour, with sparse yellow tomentum. Face has no perceptible facial knob, but a moustache of sparse white hairs occupies basal half, and is surmounted by very short, scaly yellow hairs which reach up to antennae. Hairs and weak bristles on ocellar tubercle, vertex and occiput, all white or pale yellowish. Proboscis

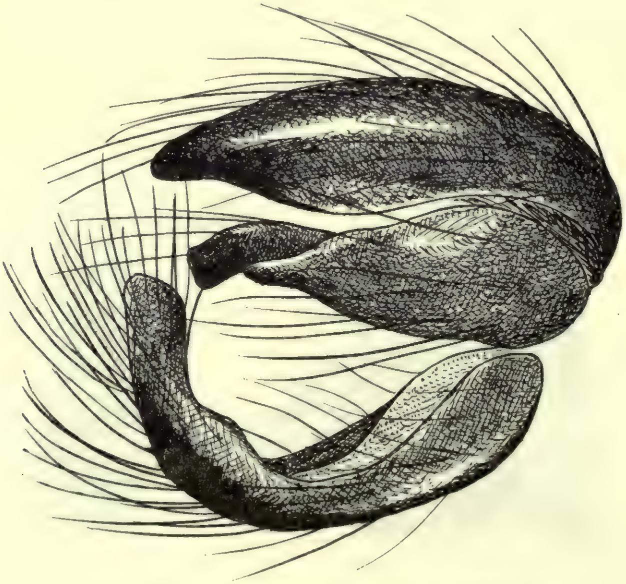


FIG. 52. *Rhabdogaster major*, ♂ genitalia.

and palpi black, with whitish hairs. Antennae black, with yellow hairs, third segment slender, pointed, as long as first two together ; style almost two-thirds as long as third segment.

Thorax. Mesonotum shining black, with only small areas of yellow tomentum, of which humeral triangles are the most conspicuous ; a narrow line of tomentum in suture at base of scutellum, and at extreme lateral margins of mesonotum. Extremely short, fine yellow hairs along lines of acrostichals and dorsocentrals, and on transverse suture. Two strong notopleurals, a cluster of four or five prescutellars, but no marginal scutellars. Scutellum shining black, rather convex, with a deep submarginal groove. Pleura also shining black with very thin white tomentum : tufts of white hairs on pronotum, propleuron, upper sternopleuron and before halteres.

Abdomen elongate, cylindrical, much longer than wings, which reach only to tip of fifth segment. First five segments bare, shining black ; sixth-eighth segments with dark brown tomentum ; all tergites with short black hairs. Venter with pale yellowish tomentum and whitish hairs. Genitalia as in Text-fig. 52, prominent.

Legs predominantly black, but knees and hind tibiae and metatarsi red or reddish, especially posteriorly. Hairs and bristles of legs almost entirely *white*.

Wings. Venation simple : anal cell closed, with short stalk, but all other cells open on wing-margin ; discal cell long and narrow, its origin almost as far back as fork of R_1/R_{2+3}. Veins brown or black. Membrane clear and apparently colourless, but with microtrichiae scattered over most of area except basally. Halteres orange.

Length of body 10 mm ; of wing 7 mm.

♀ Similar. Ovipositor simple, with acanthophorites and a small ventral keel.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 3480, Inimvua, 16.v.1952 (IPNC).

Paratype ♀. Same data as holotype.

Tribe **STICHOPOGONINI**

This is a small tribe of interesting Asilidae, set apart from Saropogonini by having the prosternum complete, or nearly so, and firmly bridged to the propleuron. The female terminalia are characteristic (Text-figs 54, 55), with the eighth sternite produced like the hull of a boat, and often with a distinct keel, surmounted by a crown of spines, and sometimes terminated with a dense brush of silky hairs. Though some Saropogonini have a similar structure it is not so fully developed.

The most obvious characteristic of this tribe is the saddle-shaped excavation of the vertex, as a result of which the eyes are much more widely separated at the vertex than opposite the antennae (Text-figs 53, 56, 57, 60).

Hull (1962 : 104) recognizes thirteen genera in this tribe, including *Eremodromus* Zimin and *Turkmenomyia* Paramonov, which were unknown to Hull, and omitted from his key. *Lasiopogon*, though apparently correctly assigned to this tribe, stands apart from the rest, and is a genus of Holarctic robber-flies that hunt in grassy areas from shrubs and low herbage. The rest of the tribe are essentially xerophilous, and are to be found sitting in full sunlight on sand, or on the stones of a dry stream-bed. For concealment they rely on their cryptic grey colouration and on the dazzling effect of the light. They sit motionless until potential prey flies overhead, and it may be that the characteristic broadening of the frons and separation of the eyes at the vertex is a device to improve stereoscopic vision directly overhead.

Apart from *Lasiopogon*, the other genera are basically very much alike, and should perhaps be reduced to subgenera of *Stichopogon*. The differences are small details of antennal structure, of the arrangement of the moustache, of the wing-venation, and of the presence or absence of pulvilli. The last character is somewhat elusive outside the tribe Leptogasterinae, occurring sporadically, and perhaps not even of generic significance ; for instance in the genus *Glyphotriclis*.

Though especially characteristic of arid areas, *Stichopogon* occurs throughout all the tropical and warm-temperate countries of the world, and is often found in stream-beds in well-watered country. In such areas, however, the number of species appears to be small, and individual species have a wide, if scattered, distribution.

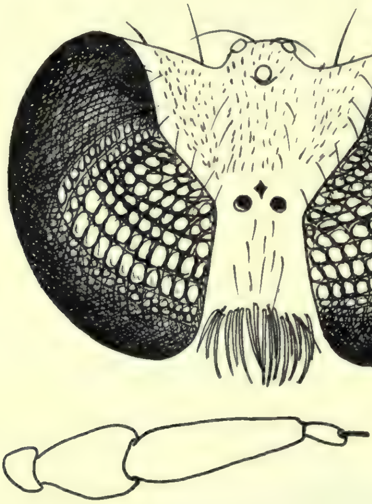


FIG. 53. *Stichopogon caffer*, head and antenna.

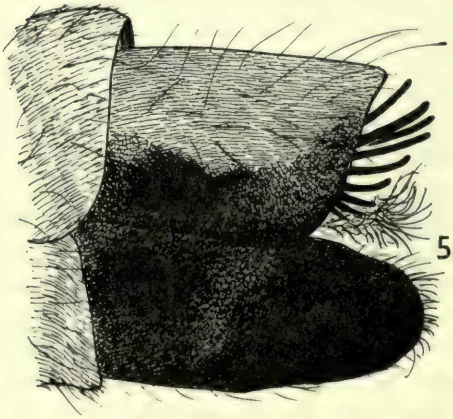


FIG. 54. *Stichopogon caffer*, ♀ terminalia.

Hull (1962) records seven species from the Ethiopian Region. Of these *Dasypogon dilutus* Walker was removed to *Stenopogon* by Miss Ricardo ; *S. grossus* from the Durban Bluffs is clearly a *Clinopogon*, and is possibly a synonym of *C. nicobarensis* Schiner, widely distributed round the shores and islands of the Indian Ocean. The remaining five species may be separated as follows:

KEY TO THE SPECIES OF *STICHOPOGON* OF THE ETHIOPIAN REGION

N.B.—Some of the species of the arid region of Egypt and the Near East may extend into eastern Africa.

1 Frons and face very much constricted at antennae (Text-fig. 60). Legs entirely black **unicolor** Ricardo, 1925 : 276
– Frons and face less heavily constricted. Legs not entirely black 2
2 Femora mainly or entirely red 3
– Femora mainly or entirely blackish 4
3 Wings with a diffuse brown patch stretching from R_1 to R_4 **maculipennis** E. & C., 1939 : 188
– Wings clear . . . . **hermanni** Bezzi, 1910 : 145
4 Grey bands of abdomen unequal, with prominent bands on segments 1, 2, 4, 5. Males with small, but very distinct spot on fork of R_{4+5}. Females with trace of dark spot, and with eighth abdominal tergite almost entirely tomented ; ventrally with conspicuous tuft of silky golden hairs (Text-fig. 55) **punctum** Loew, 1851 : 15 (p. 284)
– Grey bands of abdomen incomplete, but equal, without any segments especially prominent. No dark spot on wings. Females with eighth tergite mostly bare and shining, tomented only dorsally, and without prominent golden tuft (Text-fig. 54) **caffer** Hermann, 1907 : 3 (p. 283)

The collection from the P.N. du Garamba contains only one species of *Stichopogon*, the widespread *S. punctum* Loew, though *S. caffer* Loew and *S. hermanni* Bezzi also occur in the Congo Basin.

Stichopogon caffer Hermann

Stichopogon caffer Hermann, 1907 : 3.

LOMAMI : Luputa, 1 ♂, 2 ♀, xii.1934–i.1935 (*Dr. Bouvier*) ; Kanjama, 1 ♂, 1931

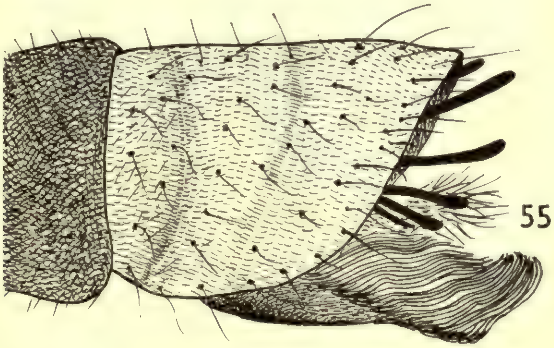


FIG. 55. *Stichopogon punctum*, ♀ terminalia.

(*R. Massart*) ; Coquilhatville, Basankusu, 1 ♀, 1949 (*ten Bunderen*) ; Ubangi : Nouvelle, Anvers, 1 ♂, 9.xii.1952 (*P. Basilewsky*) ; Stanleyville : 1 ♀, 4.iii.1928 (*A. Collart*) (MRAC). Urundi : Minago, 1 ♂, 5.iv.1949, 730 m (FJF).

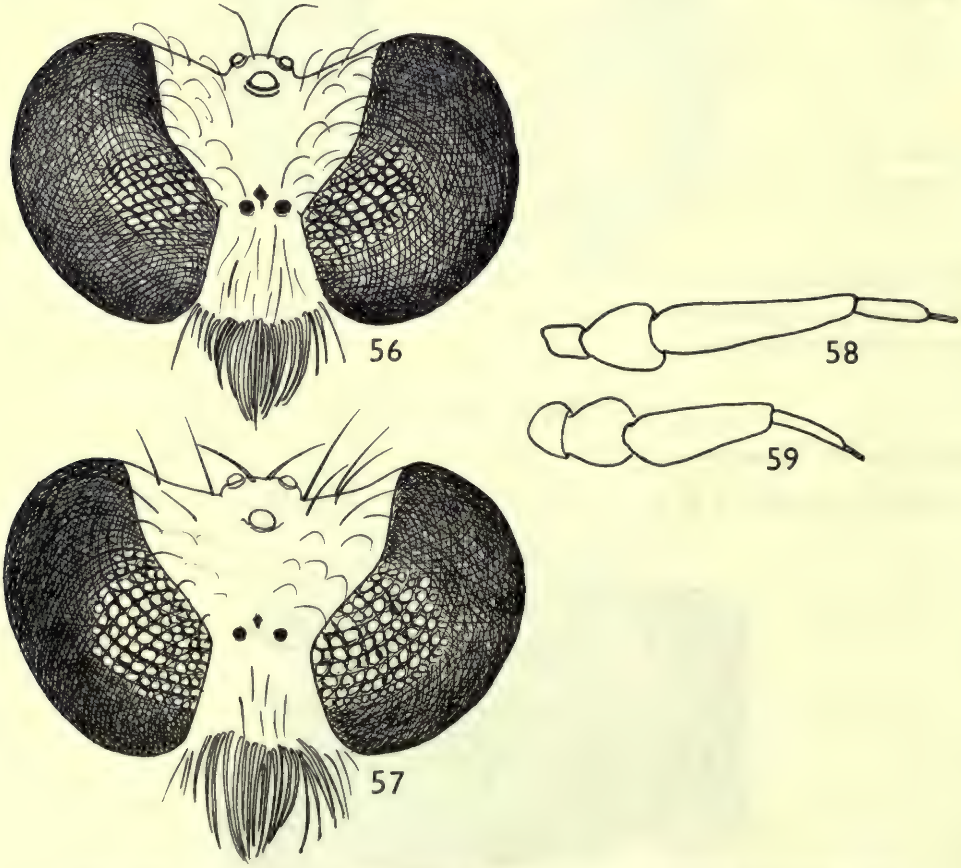
Stichopogon punctum Loew

(Text-figs 56, 58)

Stichopogon punctum Loew, 1851 : 15.
Stichopogon punctatus Loew, 1852 : 658.

Garamba National Park : 1461, II/fc/18, 1 ♀, 28.iii.1951 ; 2910, II/fd/17, 1 ♂, 14.xii.1951 ; 3177, II/gb/14, 2 ♀, 8.iii.1952 ; 5262, II/fe/18, 1 ♀, 31.iii.1952 ; 214, I/b/2, 1 ♂, 22.ii.1950 ; 1223, II/ed/17, 1 ♀, 6.ii.1951 ; 1167, II/fc/5, 1 ♀, 31.i.1951 ; 94, I/b/3, 1 ♀, 11.i.1950; 199, I/a/3, 1 ♂, 7.iii.1950 (IPNC). The last two females are distinctly larger than the others, but seem otherwise conspecific.

Bas-Congo : Boma, 2 ♀, v.1913 (*Dr. Bequaert*) ; Kwango : Popkabaka, 2 ♀,



Figs 56–59. 56, *Stichopogon punctum*, head. 57. *Stichopogon hermanni*, head. 58, *Stichopogon punctum*, antenna. 59. *Stichopogon hermanni*, antenna.

iii.1952 (*L. Pierquin*) ; Mayidi, 1 ♀, 1942 (*P. van Eyen*) ; TANGANIKA : Mpala, 780 m, 2 ♀, vii/viii. 1953 (*H. Bomans*) ; Dt. de BONGALA : 1 ♀, viii.1920 (*L. Burgeon*) ; Stanleyville, 1 ♀, 9.iii.1927 (*A. Collart*) (MRAC).

URUNDI : Nyanza Lac, alt. 780 m, 3 ♂, 5 ♀, 20.ix.1948 ; Usumbura, Lac, 3 ♀ 19.v.1955 (FJF).

Stichopogon hermanni Bezzi

(Text-figs 57, 59)

Stichopogon hermanni Bezzi, 1910 : 145.

COQUILHATVILLE : Eala, 1 ♀, iii.1932 (*H. J. Brédo*). (MRAC)

Tribe **XENOMYZINI**

These are the ' goggle-eyed ' flies referred to in the Introduction, distinguished to the naked eye by the reduction of frons and face, and antero-posteral flattening of the head into a disc in which the eyes are large and prominent.

These features differ only in degree from conditions in many other genera of Asilidae, and are sometimes difficult to assess : it is generally easy to say when flies are ' goggle-eyed ', but not so easy to be certain when they are not. In the Ethiopian Region the prosternum is fully bridged to the pronotum in Xenomyzini, but this is not necessarily true in other Regions.

My key to genera (Oldroyd, 1963 : 7) recognized eight genera in this tribe, but a later revision of the genus *Rhipidocephala* (Oldroyd, 1966) rejected *Holcocephala* as not African, and merged *Margaritola* and *Paroxynoton* into *Rhipidocephala*. This

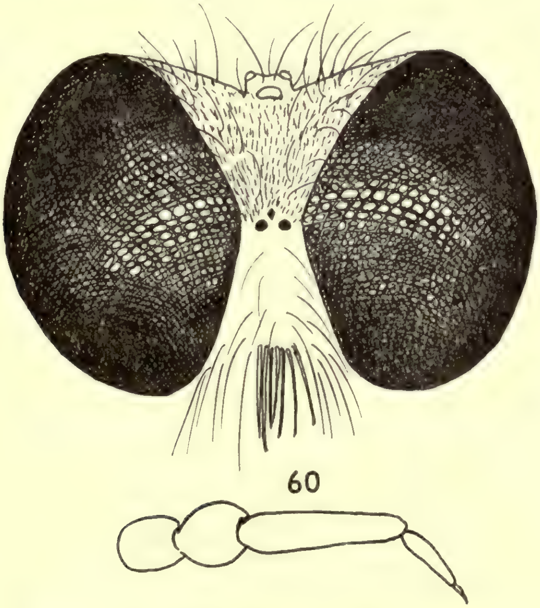


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FIG. 60. *Stichopogon unicolor*, head and antenna.

reduced the Xenomyzini of the Ethiopian Region to four genera : *Oxynoton* Janssens ; *Rhipidocephala* Hermann ; *Xenomyza* Wiedemann and *Oligopogon* Loew.

KEY TO GENERA OF AFRICAN *XENOMYZINI*

1 Third antennal segment small, with long arista. Anal cell closed and stalked ; fifth posterior cell making contact with discal cell . ***XENOMYZA*** Wiedemann (p. 287)

– Third antennal segment elongate, with apical style. Anal cell open, or barely closed ; fifth posterior cell not making contact with discal cell. (Text-fig. 69) . 3

2 Mesonotum with an exaggerated hump, strongly projecting forwards. Ovipositor with spines (acanthophorites) . . . . ***OXYNOTON*** Janssens (p. 286)

– Mesonotum in side view symmetrically rounded 3

3 Second segment of antennal style with long hairs. Abdomen elongate-cylindrical. Ovipositor with spines (acanthophorites) . . . ***OLIGOPOGON*** Loew (p. 294)

– Both segments of antennal style with short hairs. Abdomen at most twice as long as broad. Ovipositor without acanthophorites ***RHIPIDOCEPHALA*** Hermann (p. 286)

OXYNOTON Janssens

Oxynoton Janssens, 1951 : 1. Type-species : *O. francoisi* Janssens, monotypic.

Remarkable for the excessive development of the mesonotum into a strong hump. The female, like the female of *Oligopogon*, has a crown of spines on the ovipositor.

Only one species of *Oxynoton* is so far known, originally described from Urundi.

Oxynoton francoisi Janssens

Oxynoton francoisi Janssens, 1951 : 1.

TANGANIKA : N.E. Kondoa, 1 ♀, May 55 (*J.F. Lamerton*) ; Gonja, May 58, 2 ♂, (*J. D. Phipps*) (BMNH).

RHIPIDOCEPHALA Hermann

Rhipidocephala Hermann, 1926 : 174 ; Oldroyd, 1966 : 149. Type-species : ***Rhipidocephala angustior*** Oldroyd, 1966, by original designation as ***analis*** Macquart ***sensu*** Hermann, ***nec*** Macquart.

Paroxynoton Janssens, 1953 : 11. Type-species : *P. tigrinum* Janssens, by original designation.

Margaritola Hull, 1958 : 255. Type-species : *Margaritola mirabilis* Hull, 1958, by original designation.

A revision of this genus was published by Oldroyd (1966), and the following records relating to the Parc National du Garamba are extracted from it :

Rhipidocephala tigrina (Janssens)

Paroxynoton tigrinum Janssens, 1953 : 12.

URUNDI : Gihanga & Bubanza (IRSNR).

Rhipidocephala morio Hermann

Rhipidocephala morio Hermann, 1926 : 180.

KATANGA : Mulungivishi, 1 ♀, i.1931 (*G. F. de Witte*) (MRAC).

Rhipidocephala congoiensis Oldroyd

Rhipidocephala congoiensis Oldroyd, 1966 : 164.

KASAI : 4♂, 3♀, 1928 (*D. Walker*) ; Dolo, 4♂, 1♀, xi.1912 (*F. Chaltin*) ; LOMAMI : Katompe, 2♀, 12.xiii.1923 (*M. Bequaert*) (MRAC).

Rhipidocephala scutata Oldroyd

Rhipidocephala scutata Oldroyd, 1966 : 166.

GARAMBA NATIONAL PARK : P.N.G., 469, I/a/1, 1 ♀, 1.v.1950 (*G. Demoulin*) ; 1588, II/hc/4, 10♂, 4♀, 20.iv.1961 (*J. Verschuren*) ; 1824, II/fd/27, 1♂, 28.v.1951 ; 1887, II/gd/7, 1♀, 8.vi.1951 ; 3323, Pidigala, 2♂, 23.iv.1952 ; 3447, II/gd/4, 2♂, 1♀, 8.v.1952 ; 3678, Ndelele, 1♂, 2♀, 4.18.vi.1952 (IPNC).

KIVU : Uviva, 3♂, 4♀, xi.1922 (*Ch. Seydel*) ; 16–23.iii.1953 (*P. Basilewsky*) (MRAC).

XENOMYZA Wiedemann

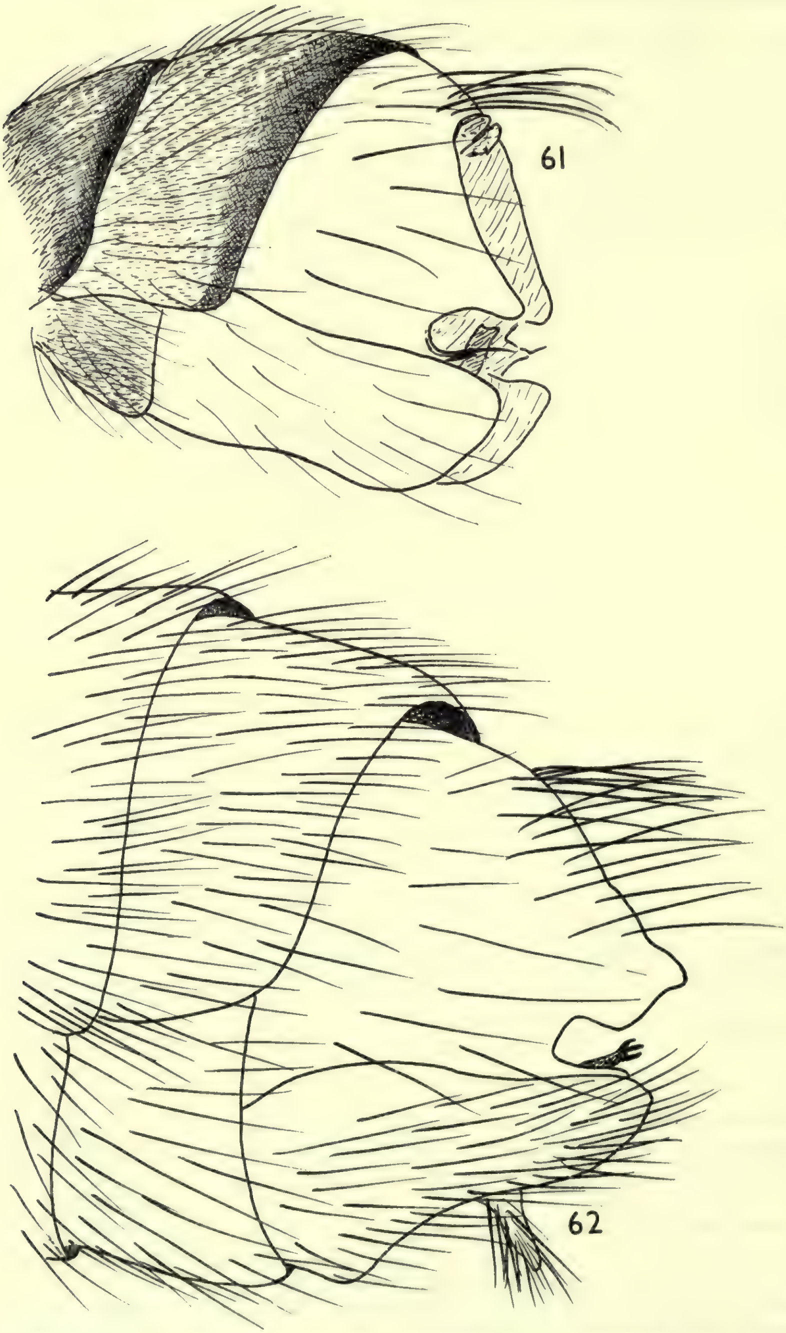
Xenomyza Wiedemann, 1817 : 60. Type-species : *Damalis planiceps* Fabricius, 1805, by designation of Coquillet, 1910.
Damalis auctt. *nec* Fabricius, 1805 : 147.

The name of this genus is usually *Damalis*, but the original concept of *Damalis* confused Asilids and Empids, and Westwood, 1835 designated as type of *Damalis* the first species, *D. curvipes* Fabr., which is an Empid. I therefore follow the example of Carrera, and use Wiedemann's name *Xenomyza* for this genus in Asilidae.

The species that have been described from Africa are nearly all from Southern Africa, and none of them appear to conform with any of the four species recognized below, which are all therefore described as new. The four are easily separated on genital characters as well as by colour differences, though, as I explain under the specific description, it is probable that specimens I have included in *taciturna* sp. n. should be separated into more than one species.

KEY TO SPECIES OF *XENOMYZA* IN THE CONGO BASIN

1 Hind femora noticeably swollen, and with strong bristles ventrally (Text-figs 65, 66) 2
– Hind femora not noticeably swollen, ventral bristles not noticeably strong. Wings typically colourless, but in some included specimens they have a yellow tinge **taciturna** sp. n. (p. 289)
2 Hind femora slender in basal half, expanding considerably in distal half (Text-fig. 65) **amphora** sp. n. (p. 290)
– Hind femora expanded over entire length (Text-fig. 66) 3
3 Mesonotum with three shining black stripes, broad, and touching each other ; scutellum covered with white tomentum . . . . **poseidon** sp. n. (p. 291)
– Mesonotum tomented, but scutellum bare and shining . . **scutellata** sp. n. (p. 292)



Figs 61, 62. *Xenomyza taciturna*, ♂ genitalia. two variants in shape.

Xenomyza taciturna sp. n.

(Text-figs 61, 62)

A variable species, by far the most numerous in the present collections, and showing a considerable range of size and colour. It may be that more than one species is confused here, but the characteristic male genitalia vary between the two types shown in Text-figs 61, 62, without any constant differences.

♂ *Head.* Ground colour brown, covered with brown tomentum ; frons entirely tomented, except for ocellar tubercle ; face mostly bare and shining brown except for upper third. Vertex with long and fairly dense black hairs. Face with very sparse brown hairs and a moustache consisting of only 5–6 black bristles in a single row. Antennae black-brown with black hairs. Proboscis and palpi black-brown but with pale hairs. Occiput with grey tomentum and white bristles.

Thorax brown, entirely covered with tomentum except for edges of humeri and of postalar calli. Tomentum of mesonotum whitish, with a pattern of three stripes in brown. Scutellum covered with whitish tomentum. Pleura with grey tomentum and a dense tuft of yellow hairs on metapleuron ; other pleura with only sparse yellowish hairs.

Abdomen black-brown in ground colour, covered uniformly with yellowish grey tomentum except for a transverse band basally on second segment. Hairs sparse, yellowish, but not noticeably longer laterally. Venter similar. ♂ genitalia as in Text-figs 61, 62, shining red-brown, contrasting with dull, blackish abdomen.

Legs clear mahogany-brown with rather long, yellowish clothing hairs, and a few fine black bristles. Hind femora as in Text-fig. 66.

Wings clear, colourless. Halteres yellow, including knob.

Length of body 8 mm ; of wing 7 mm.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 3461, Inimvua, 16.v.1952 (IPNC).

Paratypes. 3488, same data as holotype, 5 ♂, 16 ♀ (IPNC) ; Garamba National Park, 3387 Mt. Embe, 3 ♀, 17–21–iv.1952 ; 3351, 3352 Pigidala, 3 ♀, 22–iv–1952 ; 3476, 3514, 3515 Aka/2, 3 ♀, 22–v–1952 ; 3481, 3499, Dedegwa, 2 ♀, 21–v.1952 ; 3941 II/gc/6, 1 ♀, 14–viii–1952 ; unnumbered, 1949–52 ; 469 I/a/1, 1 ♂, 1–v–1950 (*G. Demoulin*) (IPNC).

This species shows considerable variation in size and colour, partly arising from differences in the age and state of preservation of the specimens, but with unusually large variations even after allowing for these factors. This is particularly true of the specimens in the collection of the Musée R. de l'Afrique centrale, many of which are considerably bigger and more yellow than the specimens from the P.N.G. For the present I provisionally identify all specimens with the male genitalia notched as in Text-figs 61, 62 as belonging to *taciturna*, but I feel sure that eventually it will be possible to set aside two, if not three species in this complex. The Congo specimens include a good series from Kifumashi (most nearly resembling the typical series from P.N.G.) ; Kapanga ; Mayumbe ; Stanleyville ; Elisabethville and Mayidi. I do not list these doubtful specimens as paratypes.

Xenomyza amphora sp. n.

(Text-figs 63, 65)

Distinguished from the other species by the characteristic shape of the hind femora, which are narrow and tubular for the basal half, abruptly swollen and flask-shaped apically.

♂ *Head.* Frons and face dull brown, entirely tomented ; without obvious hairs except for a fringe of short black hairs across vertex, and on ocellar tubercle ; very short black hairs on face are visible only at an oblique angle. Moustache consists of four black bristles on epistoma. Antennae with first segment shining brown, second tomented black-brown, both with black hairs ; third segment shining black-brown, aristiform extension white apically. Proboscis and palpi brown with black hairs. Occiput red in ground colour with thin brown tomentum and fine black hairs.

Thorax. Mesonotum dark brown, yellow on humeri, postalar calli, scutellum and a prescutellar area. Also with faint traces of two narrow black stripes, with brown tomentum but with no obvious hairs. Pleura dull, yellow and brown, entirely tomented, hairs only on metapleuron before halteres.

Abdomen strongly constricted basally, with whole of second segment and base of third narrowed, third segment then broadening abruptly ; posterior abdomen has an oval outline. Shining red-brown, more yellow laterally, and all the broader segments with close-lying short brown and black hairs. Venter reddish with a few short black hairs. ♂ genitalia (Text-fig. 63) downturned, with on each side a long process and a cluster of three strong black bristles.

Legs blackish brown, translucent. Basal half of hind femora and hind tibiae more yellowish, slender, apically clavate and blacker. Hind femora with a few strong, short spines ventrally near tip (Text-fig. 65), and other bristles on enlarged hind trochanters. Bristles and hairs of legs black, sparse.

Wings uniformly dark brown, with dense microtrichiae on both surfaces. Halteres with red stem and black knob.

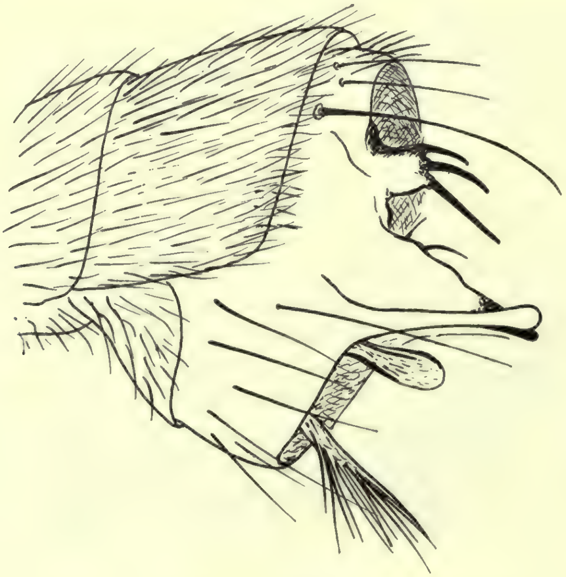


FIG. 63. *Xenomyza amphora*, ♂ genitalia.

Length of body 9 mm ; of wing 9 mm.
♀ closely similar.

Holotype ♂. UELE : Bambesa, ix–xii.1933 (*H. J. Brédo*) (MRAC).

Paratypes. Same data as holotype, 2 ♀ ; LEOPOLDVILLE : Kikwit, 1 ♀, x.1920 (*P. Vanderijst*) ; TERR. DE KASONGO : R. Lumami, 1 ♀, x–xii.1950 (*Benoit*) (MRAC).

Xenomyza poseidon **sp. n.**

(Text-figs 64, 66)

A brilliant little species, with most of mesonotum and legs shining black. It has hind femora like those of *scutellata* sp. n., but has the colour-differences shown in the key.

♂ *Head* shining black in ground colour, with dense pale yellow tomentum, which leaves certain clearly defined areas bare, shining black : a narrow triangle surrounding ocellar tubercle; a transverse line through bases of antennae ; lower third of face, underlying all swollen facial tubercle. Moustache consisting of 4–6 isolated black bristles ; short hairs pale, present only at vertex and on parafacial areas. Antennae black, third segment and apex of second more mahogany-brown, apical half of arista white ; first two segments with black hairs, third segment elongate, tapering. Palpi black with black bristles ; antennae black-brown with yellow hairs. Occiput entirely tomented grey, with a single row of light yellowish occipital bristles.

Thorax shining black, with dense yellowish white tomentum, which leaves certain areas bare and shining black ; mesonotum with a broad, divided, median stripe, flanked by the usual double spot on each side, but all stripes end abruptly opposite wing-bases. Scutellum covered with tomentum except for a very narrow black rim. Numerous very short black bristles in clusters, especially thick on upper supra-alar area. Pleura similarly covered with tomentum,

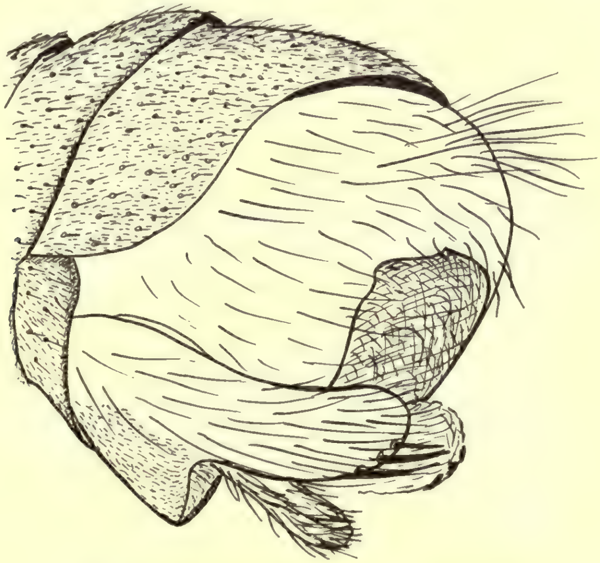


FIG. 64. *Xenomyza poseidon*, ♂ genitalia.

but without short spines, leaving bare two large areas, one on mesopleuron and one immediately behind it, on pteropleuron. Pronotum, propleuron and metapleuron with fine pale yellowish hairs. No marginal scutellar bristles are visible.

Abdomen without a constriction (cf. *amphora* sp. n.), but second segment distinctly grooved transversely. Abdomen, like thorax, black in ground colour, with areas of white tomentum anteriorly and laterally on each segment (only laterally on second segment), and with areas of short spines posteriorly and laterally on all segments. Venter shining black with posterior tomentum on each segment, and with short yellowish hairs. Genitalia as in Text-fig. 64.

Legs black, middle and hind tibiae orange, darker at tip. Hind femora as in Text-fig. 66, swollen along whole length, and with a double row of strong black spines ventrally. Other femora less swollen, and with only isolated spines. Bristles and most hairs black, but many clothing hairs yellow.

Wings almost uniformly brown, alula a little paler. Halteres orange including knob.
Length of body 10 mm ; of wing 9 mm.

♀ Similar, knob of halteres dusky.

Holotype ♂. KATANGA : Elisabethville, 12.xii.1924 (MRAC).

Paratype ♀. Elisabethville, Lubumbashi, 20.xii.1920 (*Dr. M. Bequaert*) (MRAC).

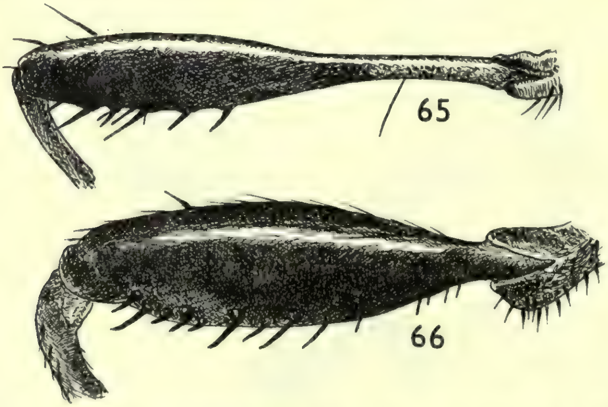
***Xenomyza scutellata* sp. n.**

(Text-fig. 67)

Shares with *poseidon* sp. n. the uniformly swollen hind femora, with double row of ventral spines, but instead of being shining black, the entire legs are honey-brown, with long, recumbent clothing hairs ; differs also in having the mesonotum more tomented but the scutellum, in contrast, bare, shining brown.

♂ *Head* black-brown, covered with dense brown tomentum, frons and face with no clearly defined bare areas. Venter with a small number of long, black hairs : frons without long hairs ; face covered with rather long, pale yellow hairs, which are reclinate, and grow upwards along face. Moustache consists of a double row of yellow bristles on mouth-margin. Antennae black : first segment with a long, black bristle ; second with a shorter brown one ; aristiform extension long, white apically. Proboscis and palpi black with yellow hairs.

Thorax shining black in ground colour, entirely covered with tomentum, but in preserved



FIGS 65, 66. *Xenomyza* spp., hind femur of ♂. 65, *X. amphora* ; 66, *X. poseidon*.

specimens this may be rubbed away in irregular areas. Tomentum is bronze, more yellow towards sides and posteriorly : in contrast, humeri, posterior calli and scutellum are all bare, shining brown. Yellow bristles, though fine, are relatively strong for the genus *Xenomyza*, and follow lines of dorso-centrals and acrostichals, as well as clustering laterally. Scutellum with 5–6 quite strong yellow marginals. Pleura covered with tomentum, yellowish, partly brownish, and with unusually abundant pale yellow hairs on pro-, meso- and metapleura.

Abdomen shining black in ground colour, with bronze tomentum. First segment with well-developed transverse membranous area, posteriorly bare and shining ; other segments only irregularly shining where rubbed. Almost bare of hairs on disc, but tufts of longer yellowish hairs laterally ; ventrally with whitish tomentum and pale yellowish hairs. Genitalia as in Text-fig. 67.

Legs honey-brown, femora and tarsi rather darker than tibiae. Hind legs noticeably long and thick compared with those of fore and middle legs ; hind femora strongly and uniformly swollen, with a double row of short, black spines ventrally. Otherwise legs mostly covered with rather long yellow bristles and long, recumbent yellow clothing hairs ; only tarsi with substantial numbers of black bristles.

Wings smoky black-brown, more intensively so anteriorly. Halteres yellow with whitish knob.

Length of body 7 mm ; of wing 7 mm.

♀ Similar.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 3450, Aka, 14.v.1952 (IPNC).

Paratypes. GARAMBA NATIONAL PARK : P.N.G., Aka, 2 ♀, 22.v.1952 (IPNC) ; Eala, 1 ♀, ix.1930 (*Dr. P. Staner*) ; Wamba, 1 ♀, 1936 (*Dr. Degotte*) ; Bambesa, 1 ♀, 30.viii.1933 (*J. V. Leroy*) (MRAC).

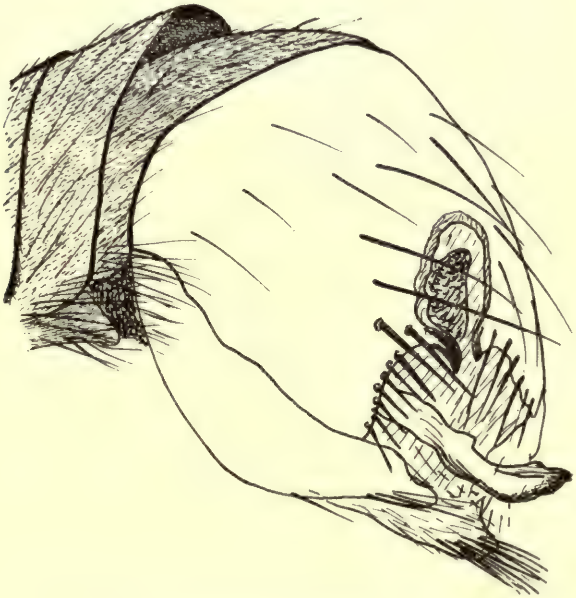


FIG. 67. *Xenomyza scutellata*, ♂ genitalia.

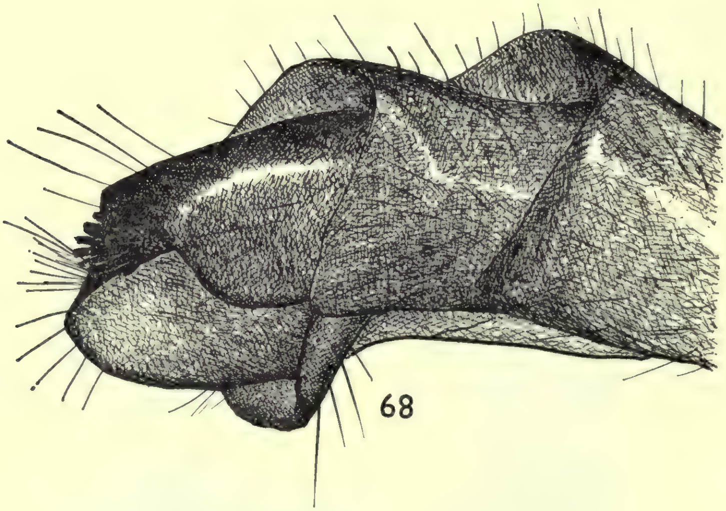
OLIGOPOGON Loew

Oligopogon Loew, 1847 : 497. Type-species: *O. hybotinus* Loew, monotypic.

This is a strange, small genus, which has attributes of both Stichopogonini and Xenomyzini. The female genitalia closely resemble those of *Stichopogon* (Text-fig. 68), but the head is quite unlike the characteristic saddle-shaped vertex and scaly moustache of the Stichopogonini. Instead, it is goggle-eyed, with a fringed antennal style, and is much like *Rhipidocephala* of the Xenomyzini. In fact, *Oligopogon* looks like a head and thorax of *Xenomyza*, with an abdomen of *Stichopogon* and legs of a Saropogonine genus such as *Holopogon*. Engel (1929 : 372) says that *Oligopogon* has strong discal bristles on the abdomen, and in his key he gives these as a means of separating *Oligopogon* from *Rhipidocephala*, but there are no such bristles in any specimen that I have seen.

One constant character of *Oligopogon* is the small size of the discal cell (Text-fig. 69), a feature which excludes *O. atrum* Bigot from the genus.

The type-species, *O. hybotinus* Loew, was described from the island of Rhodes,



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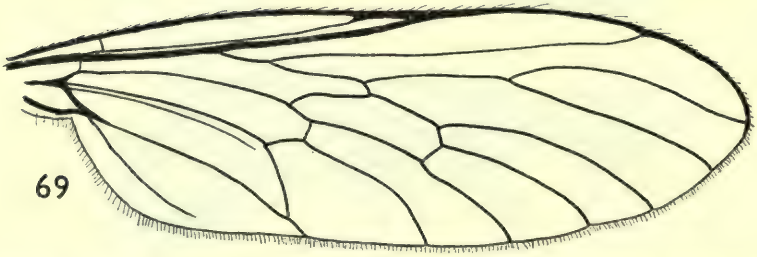


69

FIGS 68–69. 68, *Oligopogon hybotinus*, ♀ genitalia ; 69, *Oligopogon hybotinus*, wing.

and this was the only Palaearctic record known to Engel (1929 : 372) ; the BMNH has one female of *hybotinus* from Turkey. Efflatoun (1937 : 290) described a distinct species *nitidus* from the Red Sea coast (Gebel Elba), which forms a link between the Palaearctic *hybotinus* and the other species of *Oligopogon* in the Ethiopian Region.

In 1858 Loew extended *Oligopogon* to the Ethiopian Region by describing *O. penicillatus* from Caffraria. Engel (1932) added *O. pollinosus* from Rhodesia, and Engel & Cuthbertson (1937) described *O. nigripennis* from the Vumba Mountains of S. Rhodesia. *O. nigripennis,* with its dark wings and rather robust appearance sounds as if it might, in fact, be a *Rhipidocephala,* but I have seen no specimen of it, and include it in the key from the description, for the sake of completeness.

Finally, *Rhipidocephala hyalipennis* Oldroyd (1959), from Madagascar, is properly an *Oligopogon.* It seems, therefore, that *Oligopogon* extends from the eastern Mediterranean down to the Cape, and it is not surprising that the present collections should include a new species from the Katanga, as well as a series of specimens from Urundi that I am unable to separate from the Palaearctic *hybotinus* Loew.

The following key includes all the species of *Oligopogon* at present known to me, but these small, obscure flies easily escape notice, and it is very likely that other species will subsequently be discovered.

Key to the Species of *OLIGOPOGON* in the Ethiopian Region

1 Wings brown 2
– Wings clear 3
2 Mesonotum with grey anteriorly ; posterior mesonotum and scutellum shining black **nigripennis** Engel & Cuthbertson, 1937 : 14
– Mesonotum with yellow or white tomentum, and 3 shining black longitudinal stripes; scutellum shining black . . . . **nitidus** Engel, 1937 : 290
3 Mesonotum with shining black stripes separated only by narrow bands of brassy tomentum. Scutellum inflated, entirely shining black except for a narrow tomented strip at base ; scutellar margin with some weak hairs but no strong bristles . . . . **hybotinus** Loew, 1847 : 498 (p. 296)
– Mesonotum without distinct longitudinal bare stripes, at least anteriorly, though it may have bare spots. Scutellum sometimes with strong bristles . . . 4
4 Scutellum entirely tomented, with two long, whitish, marginal bristles . . . 5
– Scutellum partly shining, inflated, with black bristles or none at all . . . 6
5 Frons relatively broader, not so deeply excavated at vertex, ocelli not falling below level of eyes. Femora entirely yellow or yellow-brown **pollinosus** Engel, 1932 : 282
– Frons relatively narrower, ocelli falling well below level of eyes. Femora blackish brown with brown tips . . . **hyalipennis** Oldroyd (Madagascar), 1959 : 277
6 Femora and antennae yellow with distinct dark band . . ♂ **harlequini** sp. n. (p. 296)
– Femora and antennae not distinctly banded, though sometimes dark with base and tip narrowly pale 7
7 Femora shining black, only extreme base and tip red, contrasting strongly with orange hind tibiae. Hairs of antennal style very long, as long as third segment **superciliatus** sp. n. (p. 297)
– Femora yellow or brown, but not contrasting strongly with tibiae. Hairs of antennal style not as long as third segment 8
8 Abdominal segments with basal bands of grey tomentum continuous. Legs bright orange-yellow . . . . ♀ **harlequini** sp. n. (p. 296)

– Abdominal segments with basal bands of tomentum broadly interrupted in middle. Legs brown . . . . **penicillatus** Loew, 1857 : 282

Oligopogon harlequini sp. n.

Distinguished from all the other species of *Oligopogon* by the conspicuous orange and black bands of the antennae and legs.

♂ *Head.* Eyes in dried specimens often rusty brown with distinct and symmetrical black spots. Face and frons almost parallel-sided, about two-thirds as broad as one eye ; black-brown, covered with dense brassy tomentum. Ocellar tubercle large, also covered with brassy tomentum, but with one pair of long, black, ocellar bristles, and several smaller pairs. Frons with fine, inconspicuous short brown hairs ; moustache covering lower half of face, but rather sparse, with a few stronger bristles, and a number of fine bristles, all yellow. First two antennal segments black, with brassy tomentum and yellow hairs ; third segment orange on basal two-thirds, black on apical third ; first segments of style yellow, bare ; second segment of style black with black hairs. Proboscis and palpi black with yellow hairs. Occipital bristles in a single row, longer and black dorsally, shorter and yellow ventrally. No distinct beard.

Thorax densely covered with brassy tomentum, with an unusual arrangement of bare, shining black spots, all in posterior half of mesonotum : a short median stripe, flanked by crescentic spots extending into supra-alar area, and a small spot on each side just in front of suture ; postalar calli partly bare ; two small spots of brown tomentum anteriorly ; scutellum bare posteriorly, tomented anteriorly. Mesonotum clothed with short, erect, fine hairs, black anteriorly and medially, yellow posteriorly and laterally ; two strong, yellow notopleural bristles, otherwise no strong bristles, even on scutellum. Pleura, including postscutellum, entirely covered with brassy yellow tomentum, with fine yellow hairs on mesonotum, and bristly yellow hairs in mesopleural fringe.

Abdomen mostly shining. Dorsally each segment brown anteriorly, black posteriorly, the proportion of black greatest on basal segments, and least towards tip of abdomen. Third to sixth segments also with a narrow basal band of white tomentum, which extends along extreme lateral margin. Hairs fine, yellow, semi-recumbent. Venter mostly light brown, with thin white tomentum, and each segment with a pair of large, bare spots. Male terminalia black or brown, with yellow hairs.

Legs yellow-brown, with distinct black bands : each femur has a broad preapical band, and each tibia a prominent black tip.

Wings clear, hyaline, no grey patches. Halteres orange.

Length of body 5 mm ; of wing 4 mm.

♀ Similar, but without dark bands on legs, which are entirely orange in the only female specimen known to me.

Holotype ♂. N. NIGERIA : Udubo, 28.viii.57 (? collector) (SAIMR).

Paratypes. Same data as holotype, 2 ♀ (SAIMR) ; GOLD COAST : N. Territories, Yagaba, 1 ♀, 11.viii.1914 (*Capt. Armitage*) (BMNH).

Oligopogon hybotinus Loew

(Text-figs 68, 69)

Oligopogon hybotinus Loew, 1847 : 498.

URUNDI : Bururi, 4 ♂, 6 ♀, x.1948 (*F. J. François*) (MRAC)

GARAMBA NATIONAL PARK : P.N.G., 308, Mt. Ndogo, 2 ♂, 4 ♀, 15.iii.1950, I/a/1, 1 ♀, i.v.50 (*Demoulin*) ; 3461, Inimvua, 1 ♀, 16.v.1952 (IPNC).

O. hybotinus was described from the island of Rhodes in the Eastern Mediterranean, and has hitherto not been known from anywhere else. In the BMNH is a female specimen from TURKEY : Antalya, Kaldivar nr Gasipazo, c. 750′, 20–22.vii.1963 (*E. James*). I have no doubt that the specimen from Turkey is correctly identified as *hybotinus*, but I am not satisfied that the examples from Urundi are really conspecific. It is not possible to decide finally until male specimens of *hybotinus* from the Palaearctic Region are available to me.

***Oligopogon superciliatus* sp. n.**

Somewhat resembling *O. penicillatus* Loew, but distinguished by the excessively long rays of the antennal style, which are as long as the entire third antennal segment, and by the strong contrast between the orange tibiae and tarsi and the black femora, orange only at base and tip.

♀ *Head.* Frons and face covered with dense yellow tomentum, rather long, and divided by a vertical median line on the frons. Two long, strong, black ocellar bristles, other hairs of frons weak and yellow. Moustache of sparse but strong black or blackish bristles. Antennae notable for the excessive length of the cilia of the style : all segments brownish, covered with yellowish tomentum, basal segments with black hairs. Proboscis and palpi black with yellow hairs. Occipital hairs in a single row : black, longer and proclinate dorsally ; white, shorter and straighter ventrally.

Thorax entirely covered with yellowish grey tomentum, in which there are bare, shining black spots of irregular extent in posterior half of mesonotum. Postalar calli brownish, bare. Scutellum with white tomentum anteriorly, shining black posteriorly ; hairs fine, erect, black, no strong marginals. Pleura black-brown in ground colour, entirely covered with yellowish grey tomentum ; metapleuron with a vertical row of long, yellowish bristles, and a few long yellow hairs on sternopleuron, otherwise pleura without hairs.

Abdomen dorsally shining black, each segment with an anterior band of white tomentum, broken in middle into two spots, which are extended laterally as narrow white margins ; hairs of dorsum short, white on tomented areas, black elsewhere, longer and paler at sides. Venter black-brown with thin white tomentum and yellowish anterior margin to each segment.

Legs. Femora black, red at base and apex ; tibiae and tarsi orange, only indistinctly darker towards tips of tarsi. Many short yellow hairs, but longer hairs and bristles mainly black.

Wings clear, hyaline, veins yellow anteriorly, black posteriorly . Halteres pale yellow.

Length of body 6 mm ; of wing 5 mm.

♂ not yet known.

Holotype ♀. KATANGA : Elisabethville, Miss. Agric. (MRAC).

Paratype ♀. Same data as holotype (MRAC).

Tribe **ASILINI**

This complex tribe of many genera is the most advanced in the family. It is characterized by the universal closure of the marginal cell, and by the third antennal segment ending not in a style, but in an *arista*, sometimes long, but always bare. The members of the tribe Ommatiini are distinguished from Asilini by having the antennal arista conspicuously feathered, but it is doubtful how much significance should be attached to this character (see under tribal heading Ommatiini).

Most Asilinae are elongate flies, with slender abdomen, and a generally dusty, appearance. The genera fall into various groups, of which one of the most distinctive is the *Promachus*-group.

The *PROMACHUS*-GROUP

Characterized by having three submarginal cells in the wing in place of the usual two. The significance of this in the evolution of Asilidae has already been discussed in the general part of this paper. The genera of this group have a rather curious distribution : *Promachus* itself occurs in every zoogeographical region, with a complexity of subgenera ; *Apoclea* is located in the middle eastern arid belt ; *Philodicus* and *Alcimus* are Indo-ethiopian ; and in central and tropical South America there is a small complex of bee-like genera centred round *Mallophora*. Apart from the distinctly bee-like habitus of the *Mallophora* subgroup, the principal distinctions are in the wing-venation. Although these differences seem trivial when described, they are remarkably constant, and they are reinforced by other differences in appearance which confirm that the genera of this group—or at least the prinicpal genera already mentioned—are really distinct.

PHILODICUS Loew

Philodicus Loew, 1848 : 391. Type-species : *Asilus javanus* Wiedemann, by original designation.

Teretromyia Bigot, 1859 : 416. Type-species : *Teretromyia cothurnata* Bigot, by monotypy.

A typically asiline genus, which occurs in the Ethiopian and Oriental Regions, and in the intervening areas of Iran and Pakistan, which are technically Palaearctic. The African species were reviewed by Blasdale (1957) with a key, and comparative figures of male and female genitalia, from which the following species of the Congo Basin may easily be recognized.

Philodicus alcimoides Blasdale

Philodicus alcimoides Blasdale, 1957 : 137.

GARAMBA NATIONAL PARK : P.N.G., 214, I/b/2, 1 ♀, 22.ii.1950 ; AKAM, 1 ♀, 24.iii.1950 ; 529, AKAM, 1 ♂, 19.v.1950 ; I/b/3, 1 ♂, 24.iv.1950 (*G. Demoulin*) ; 585, I/a/M, 1 ♀, 7.vi.1950 (*G. Demoulin*) ; 730, AKAM, 1 ♀, 28.vii.1950 (IPNC).

Philodicus doris (Curran)

Alcimus doris Curran, 1927 : 18.

Philodicus doris (Curran) Blasdale, 1957 : 144.

GARAMBA NATIONAL PARK : P.N.G., 316, I/a/1, 1 ♂, 1 ♀, 20.iii.1950 ; 465, I/b/2s, 1 ♂, 26.iv.1950 ; 497, I/a/3, 1 ♂, 8.v.1950 ; 483, I/a/1, 1 ♀, 5.v.1950 ; 529, AKAM ; 1441, II/db/4, 1 ♂, 1 ♀, 23.iii.1952 ; 1444, II/bd/4, 1 ♀, 23.iii.1951 ; 1458, II/fc/5, 8 ♂, 10 ♀, 27.iii.1951 ; 1461, II/fc/18, 1 ♂, 28.iii.1951 ; 1494, II/fd/17, 1 ♂, 4.iv. 1951 ; 1537, II/gc/7, 1 ♀, 14.iv.1951 ; 1672, II/gd/4, 2 ♂, 1 ♀, 8.v.1951 ; 1506. II/gf/10, 2 ♀, 6.iv.1951 ; II/gd/4, 2 ♂, 1 ♀, 13.iv.1951 ; 1798, II/fd/15, 1 ♂, 24.v.

1951 ; 1803, II/fd/17, 1 ♂, 25.v.1951 ; 1824, II/fd/17, 1 ♀, 28.v.1951 ; 1911, II/fc/6, 1 ♂, 13.vi.1951 ; 2910, II/fd/17, 1 ♂, 1 ♀, 14.xii.1951 ; 3250, Ndelele, K 120/2, 5 ♂, 4 ♀, 28.iii.1952 ; 3298, Ppk, 14/g/7, 8 ♂, 2 ♀, 4.iv.1952 (IPNC).

ITURI : Akini, N. Aru, 1 ♀, v.1936 (*Dr. Pasteels*) ; LOMAMI : Lusuku, 1 ♀, xii.1930 (*P. Quarré*) ; KASAI : Poste II, 1 ♀, 23.iv.1912 (*Dr. Mouchet*) ; Elisabethville, 2 ♂ (*Dr. Bequaert*) ; Kasai, 1 ♂ (*Dr. Walker*) (MRAC).

Philodicus nigrescens Ricardo

Philodicus nigrescens Ricardo, 1921 : 181 ; Blasdale, 1957 : 145.

GARAMBA NATIONAL PARK : P.N.G., 71, I/o/1, 1 ♂, 28.xii.1949 ; 74, I/b/2, 1 ♂, 28.xii.1949 ; 75, I/b/3, 2 ♀, 2.xii.1949 ; 146, I/a/2, 1 ♂, 2.i.1950 (*G. Demoulin*) ; 214, I/b/2, 2 ♂, 2 ♀, 22.iii.950 ; 261, I/b/3, 1 ♀, 305, Mt. Ndogo, 4 ♂, 2 ♀, 15.iii.1950 ; 327, Akam, 1 ♂, 24.iii.1950 ; 483, I/a/1, 1 ♂, 5.v.1950 (*G. Demoulin*) ; 529, Akam, 4 ♂, 2 ♀, 19.v.1950 ; 585, I/a/M, 3 ♂, 7.vi.1950 (*G. Demoulin*) ; 853, I/o/3 arcl, 2 ♂, 1 ♀, 29.ix.1950 (*G. Demoulin*) ; 1426, II/fd/18, 1 ♀, 19.iii.1951 ; 1458, II/fc/5, 1 ♀, 27.iii.1951 ; 1461, II/fc/18, 1 ♀, 28.iii.1951 ; 1561, II/fb/18, 1 ♀, 18.iv.1951 (*J. Verschuren*) ; 1576, II/fb/4, 1 ♂, 19.iv.1951 (*J. Verschuren*) ; 1538, II/hc/4, 2 ♀, 20.iv.1951 (*J. Verschuren*) ; 1947, II/gd/8, 1 ♀, 20.vi.1951 ; 2016, II/gc/6, 1 ♂, 29.vi.1951 ; 2379, II/fd/17, 1 ♂, 2 ♀, 5.ix.1951 ; 3500, Nagero, 1 ♀, 10.v.1952 ; 2917, II/gc/15, 1 ♂, 17.xii.1951 (IPNC).

MANYEMA : Nyangwe, 9 ♂, 5 ♀, 4.v.1918 (*R. Mayné*) ; Niambi, 1 ♂, 23.iv.1931 (*G. F. de Witte*) ; TANGANIKA : 1 ♀ (*Lemaire*) ; KATANGA : 1 ♂, 18.v.1925 (*G. F. de Witte*) ; UELE : Dunga, 1 ♀ (*de Greef*) ; Bukama, 3 ♀, xi.1911 (*Dr. Bequaert*) ; LUALABA : Kabelwe, 1 ♀, 24.vi.1947 (*Dr. M. Poll*) (MRAC).

Philodicus furunculus Blasdale

Philodicus furunculus Blasdale, 1957 : 146.

GARAMBA NATIONAL PARK : P.N.G., 497, I/a/3, 1 ♀, 8.v.1950 ; 509, Km 17, 2 ♀, 10.v.1950 ; 594, I/a/1, 1 ♀, 12.vi.1950 ; 1494, II/fd/17, 1 ♂, 4.iv.1951 ; 1824, II/fd/17, 1 ♂, 28.v.1951 ; 1855, II/gc/4, 1 ♀, i.vi.1951 ; 2024, II/gd/14, 2 ♀, 30.vi.1951 ; 3401, II/gc/10, 1 ♀, 20.iv.1952 ; 3410, II/gd/4, 2 ♀, 2.v.1952 ; 3449, II/gd/4, 1 ♀, 8.v.1952 ; 3476, Aka/2, 2 ♀, 19.v.1952 ; 3488, Inimvue, 1 ♂, 1 ♀, 20.v.1952 ; 3515, Aka/2, 1 ♀, 22.v.1952 ; 3583, Garamba/2 (source), 1 ♀, 6.vi.1952 (IFNC).

KATANGA : Elisabethville, 21 ♂, 11 ♀ (various collectors) ; Lomami, Kambaye, 3 ♂, 6 ♀, vii.1930 (*P. Quarré*) ; LULUA : Kapanga & R. Kapelekese, 1 ♂, 4 ♀, 1932/33 (*F. G. Overlaet*) (MRAC).

Philodicus temerarius (Walker)

Trupanea temerana Walker, 1851 : 121 ; Blasdale, 1957 : 145.

This species is not represented in the collections from the Parc National du Garamba, but it is widespread in the Congo Basin.

The specimens in the collections of the Musée Royale de l'Afrique centrale are too numerous to be listed in detail, but there are specimens from the following localities : Bambesa ; Eala ; Mayidi ; Congo da Lemba ; Stanleyville ; Ituri ; Coquilhatville ; Uele ; Bambesa ; Tshuapa ; Bokuma ; Mayumbe ; Kisantu ; Sankuru ; Komi ; Equateur ; Abumombazi ; Léopoldville.

Philodicus swynnertoni Hobby

Philodicus swynnertoni Hobby, 1933 : 109 ; Blasdale, 1957 : 144.

URUNDI : Gihanga, Ruzizi, 1 ♂, 5 ♀, xi.1951 ; Terr. de Bubanza, 3 ♂, 23.ix.1951 (FJF).

LULUA : Kasai, 2 ♂, 4 ♀, 1918 (*Dr. Walker*) ; Luashi, 1 ♂, xi.1938 (*F. Freyne*) ; LOMAMI : Lusuku, 2 ♀ (*P. Quarré*) ; UELE : Aba, 2 ♂, 5 ♀ (*M. Hutereau*) ; LUKUGA : Niemba, 1 ♂, 1 ♀, xi.1917 (*Dr. Pong*) ; Beni Bendi, 1 ♂, v.1915 (*R. Mayné*) ; Bogo, 1 ♂, 7.iii.1912 (*A. Pilette*) ; SANKURU : Pania, Natumbo, 1 ♂, 1947 (*V. Lagae*) ; ITURI : Akini (*A. Aru*), 2 ♀, v.1936 (*Dr. Pasteels*) (MRAC).

Philodicus cinerascens (Ricardo)

Alcimus cinerascens Ricardo, 1900 : 139.
Philodicus umbripennis Ricardo, 1921 : 184.
Philodicus cinerascens (Ricardo) Blasdale, 1957 : 139.

URUNDI : Terr. de Bubanze, 2 ♀, 6.iii.1952 ; Terr. de Bururi, 3 ♂, 1 ♀, 19.v.1952 ; Rumonge, 7 ♂, 4 ♀, 1948–49 (FJF).

TANGANIKA : Mpala, 3 ♂, vii/viii, 1953 (*H. Bomans*) ; E. TANGANIKA : Kigoma, 1 ♂, 3 ♀, ix.1918 (*R. Mayné*) ; Albertville, 2 ♂ (*R. Mayné*) ; Kasenyi, 2 ♂, 2 ♀ (*H. J. Brédo*) ; URUNDI : Rumonge, 6 ♂, 4 ♀, 7.iii.1953 (*P. Basilewsky*) (MRAC).

PROMACHUS Loew

Trupanea Macquart, 1838 : 91, *nec* Schrank, 1803. Type-species : *Asilus maculatus* Fabricius, by original designation.

Promachus Loew, 1848 : 390. Type-species : *Asilus maculatus* Fabricius, by designation of Coquillet, 1910.

A large and complex genus, which occurs in all the zoogeographical regions, and is easily recognized by the particular shape of the three submarginal cells.

Although distinctive at generic level, *Promachus* includes a great diversity of species. Hull (1962) recognizes six subgenera (not five as he says), but the status of these is uncertain. The subgeneric differences are mostly in the antennal arista and in the form of the ovipositor : the former is often variable between closely related species, and the latter appears to be an adaptive character, related to the site of oviposition, and thus not necessarily indicative of relationships.

The African species have never been revised in their entirety, as yet. Miss Ricardo (1920) published partial keys, but besides being incomplete they were ill-constructed and difficult to use. At the present time (1969) Mr. P. Blasdale, who revised the African species of *Philodicus* in 1957, has work in progress on the species of *Promachus*, and has kindly examined the species of *Promachus* taken in Garamba by the Mission H. De Saeger.

Promachus sp. 1

GARAMBA NATIONAL PARK : P.N.G., 1412, II/gd/4, 5 ♂, 1 ♀, 17.iii.1951 ; 1441, II/cb/4, 1 ♀, 23.iii.1951 ; 3450, Aka, 1 ♂, 2 ♀, 14.v.1952 ; 1299, II/hc/10, 9 ♂, 7 ♀, 28.ii.1951 ; 1314, II/kc/10, 3 ♂, 4 ♀, 2.iii.51 ; 1458, II/fc/5, 3 ♂, 1 ♀, 27.iii.1951 ; 1444, II/hc/4, 1 ♀, 23.iii.1951 ; 1506, II/gf/10, 1 ♀, 6.iv.1951 (IPNC).

Promachus sp. 2

GARAMBA NATIONAL PARK : P.N.G., 1299, II/hc/10, 1 ♂, 2 ♀, 28.11.1951 ; 3298, PpK 14/g/7, 1 ♂, 4.iv.52 ; 3267, Ndelele, 1 ♂, 1 ♀, 27.iii.1952 ; 1412, II/gd/4, 5 ♂, 5 ♀, 17.iii.1951 ; (IPNC).

Promachus sp. 3

GARAMBA NATIONAL PARK : P.N.G., 1314, II/ke/10, 3 ♂, 1 ♀, 2.iii.51 ; 3298, PpK 14/g/7, 2 ♂, 4.iv.1952 (IPNC).

This and the previous species are obviously closely related, and the existence of four indeterminate females suggests that they might be conspecific.

Promachus sp. 5

GARAMBA NATIONAL PARK : P.N.G., 2615, PpK 529, 1 ♂, 16.x.1951 (IPNC).

Promachus sp. 6

GARAMBA NATIONAL PARK : P.N.G., 903, I/a/1, 1 ♂, 26.x.1950 ; 1273, Gongala, 1 ♀, Oct. 1950 (IPNC).

Promachus ugandiensis Ricardo

GARAMBA NATIONAL PARK : P.N.G., 176, I/a/2, 1 ♂, 23.i.1950 ; 204, I/b/3, 2 ♀, 8.x.1950 ; 205, I/a/1, 1 ♂, 13.xi.1950 ; 3134, Mabanga, 9''', 2 ♂, 1 ♀, 19.11.1952 (IPNC).

THE *FASCIATUS*-GROUP

This is a striking group of species centred round *Promachus fasciatus* (Fabricius), 1775, and recognized by having the first three tergites of the abdomen adorned with double fringes of white or golden hairs.

The present collection contains four females of this species-group. The males have distinctive genitalia, and may be identified by using an excellent paper by Hobby (1936 : 182–199, 231–249, 274–278). Unfortunately the females cannot be confidently identified, except by association with males, and so the females in this collection can only be listed, as follows :

GARAMBA NATIONAL PARK : P.N.G., 1527, II/gd/4, 1 ♀, 13.iv.1952 ; 1872, II/bc/8, 1 ♀, 5.vi.1952 ; 2059, II/gc/13s, 1 ♀, 12.vii.1951 ; 2341, II/fd/17, 1 ♀, 31.viii.51 (IPNC).

HELIGMONEURA Bigot

Heligmoneura Bigot, 1858 : 357, 662. Type-species : *H. modesta* Bigot, monotypic.

Engel (1927 : 135) discussed the definition and relationships of this genus, and especially its distinction from *Neomochtherus*, for which he presented a table. *Heligmoneura* is one of several genera in which the vein R_5 of the wing has a pronounced angle at mid-length ; it has pilose metanotal callosities, and a low facial hump, which becomes nasiform through the narrowing of the face. In the male the upper forceps (epandrium) is forked, and often conspicuously so (Text-figs 70–72). The ovipositor is short and downturned.

Seven species from Africa and Madagascar remain in *Heligmoneura* after making allowances for past confusion with other genera such as *Neomochtherus* and *Neolophonotus*. The present collection contains three species, only one of which is from the P.N. Garamba. The three species are easily separated by the very distinctive male genitalia (Text-figs 70–72) ; a key to species using other characters, and applicable also to females, awaits a fuller study.

Heligmoneura laevis Engel

(Text-fig. 70)

Heligmoneura laevis Engel, 1927 : 137.

This was one of the species recognized by Hermann, but not published before his

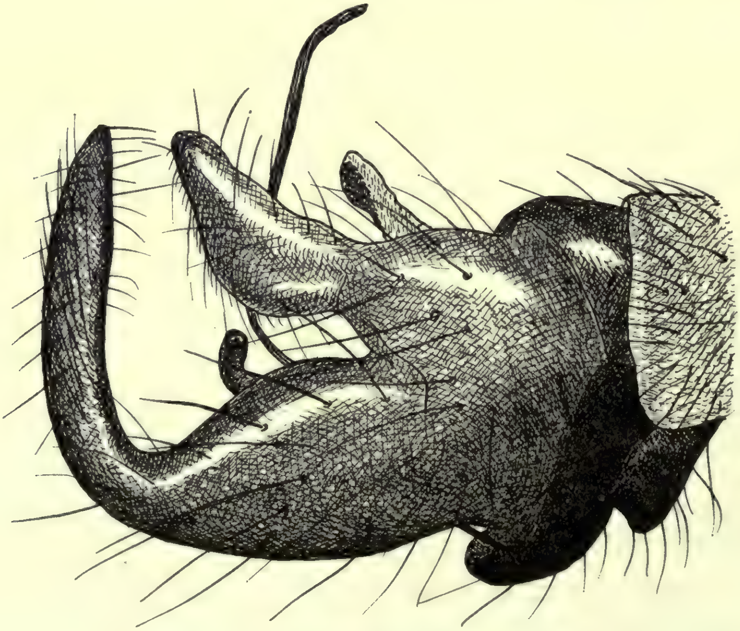


FIG. 70. *Heligmoneura laevis*, ♂ genitalia.

death ; Engel (1927) attributes the species to ' Hermann *in litt.*', but it appears that Engel was the author of the published description, and hence of the name.

The form of the male genitalia (Text-fig. 70) appears distinctive, but small variations occur, and it is possible that more than one species has male genitalia of this type. A particular problem is *Neomochtherus litoralis* Lindner (1955), which is annotated in the original paper ' Auch nach Oldroyd " not *laevis* Engel, probably new ". .' I saw the specimen afterwards made type of *litoralis*, which was from Dar-es-Salaam, but it is not now before me. From the description and figure it is certainly a *Heligmoneura*, not *Neomochtherus*, and very close to *H. laevis*. It appears to differ from *laevis* in having more pale hairs and bristles on the thorax, but clearly this needs to be corroborated by evidence from more specimens.

H. laevis was described from the Waterburg District of the Transvaal, and is known from Malawi. The present record of the species from the P.N. du Garamba extends the range considerably, with *litoralis* in Dar-es-Salaam as a possible link.

GARAMBA NATIONAL PARK : P.N.G., 1249, II/id/4, 1 ♀, 14.ii.1951 ; 1494, II/fd/17, 7 ♂, 4 ♀, 4.iv.1951 ; 1527, II/gd/4, 2 ♀, 13.iv.1951 ; 1610, II/gd/4, 1 ♀, 25.iv.1951 (*J. Verschuren*) ; 1612, II/ee/14, 1 ♀, 26.iv.1951 (*J. Verschuren*) ; 2917, II/gc/15, 1 ♀, 17.xii.1951 ; 3401, II/gc/10, 1 ♂, 29.iv.1952 ; 3449, II/gd/4, 1 ♂, 8.v.1952 ; 1458, II/fc/5, 1 ♂, 27.iii.1951 ; 1855, II/gc/4, 1 ♀, 1.vi.51 ; Nagero, 1 ♀, 2/29.ix.1954 (*Nebay*) ; 1537, II/gc/7, 1 ♂, 14.iv.51 ; 1684, II/gd/4, 1 ♂, 7.v.1951 (IPNC).

Heligmoneura modesta Bigot

(Text-fig. 71)

Heligmoneura modesta Bigot, 1858 : 357.

A West African species, which spreads across into the Congo Basin, and so has a distribution complementary to that of *laevis* above.

GARAMBA NATIONAL PARK : P.N.G., 786, ±/0/1, 1 ♀, 25.viii.50 (*Demoulin*) ; 868, I/0/2, 1 ♀, 5.x.1950 (*Demoulin*) ; 944, I/0/1, 1 ♂, 9.x.i.1950 (IPNC).

UELE : Bambesa, ix–x.1933 (*J. V. Leroy* ; *H. J. Brédo*), 3 ♂, 4 ♀ ; Bambili (*Dr. Rodhain*), 1 ♂ ; Tukpwu, 1 ♂, ix.1937 (*L. Leconte*) ; Albertville, 1 ♂, i.1919 (*R. Mayné*) ; Libenge, 29.xi.1939, 1 ♂ (*Leontovitch*) (MRAC).

***Heligmoneura rodhaini* sp. n.**

(Text-fig. 72)

A single male, abundantly distinguished from the preceding two species by the genitalia (Text-figs 70–72). The upper forceps are less deeply cleft than in those species, and suggest the even less elaborate male genitalia of *H. africana* Ricardo, from Nyasaland. This raises the question of the separation of *Heligmoneura* from *Neomochtherus*, readily apparent between typical species of each, but less certain when the genitalic differences are smaller.

♂ *Head*. Space between eyes broader than in *H. modesta* (cf. Engel, 1927 : 135), at antennae greater than length of first antennal segment, but not as great as sum of first plus second seg-

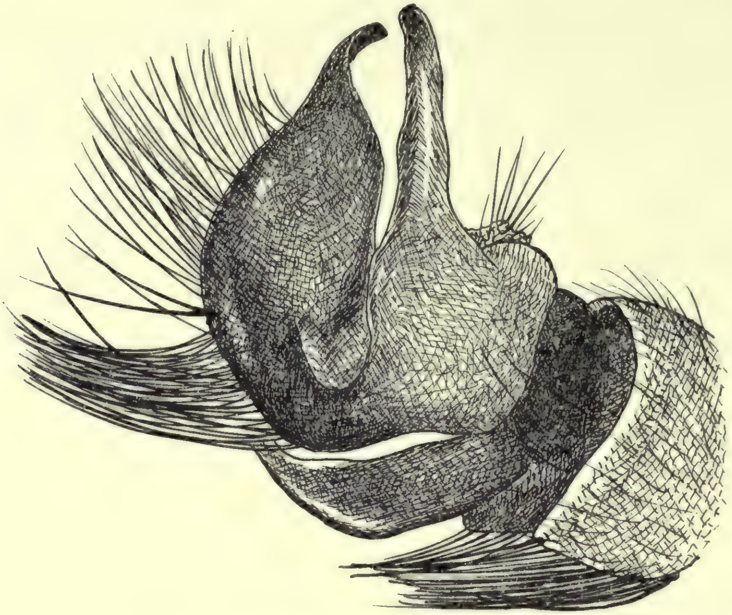


FIG. 71. *Heligmoneura modesta*, ♂ genitalia.

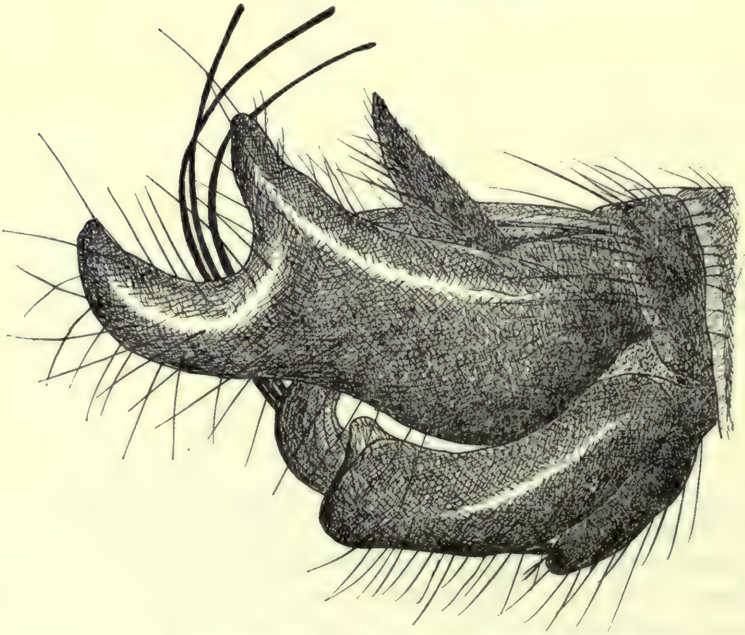


FIG. 72. *Heligmoneura rodhaini*, ♂ genitalia.

ments ; slightly narrower at vertex, and broader at mouth margin. Tomentum of face and frons brassy yellow ; frons with black hairs along each eye-margin ; facial hump moderate, of same shape as usual in *Heligmoneura*, but not so nasiform ; moustache yellow centrally and ventrally, black dorsally. Antennae rather elongate, almost as long as height of one eye, al segments proportionately elongate, arista 1½ times as long as third segment. Palpi and proboscis black with yellow hairs ; beard and lower occipital bristles yellow, upper occipital bristles black.

Thorax. Pronotum with yellow bristles and yellow hairs. Mesonotum entirely tomented yellowish grey, with a rather indistinct pattern of brown ; two longitudinal stripes, and three pairs of lateral spots ; covered with short, bristly black hairs, and with longer, strong black bristles. Scutellum with short, black hairs and with two strong marginal bristles, which, in type-specimen, are one yellow and one black. Pleura uniformly tomented, with a few sparse yellow hairs, and with yellow bristles before halteres.

Abdomen dorsally dull black, with broad yellow hind margins, covered with ashy grey tomentum ; clothed, except of yellow bands, with short, bristly black hairs, longer and stronger posteriorly on each segment, and stronger still laterally ; strongest lateral hairs and bristles are yellow. Genitalia (Text-fig. 72) shining black, hairs and bristles mainly yellow or brown.

Legs. Orange, with black trochanters, and small black tips to femora and to hind tibiae. Hairs and bristles mainly black on hind legs and dorsally on others ; yellow elsewhere.

Wings infuscated at tip and along hind margin as far inwards as fork of M_{3+4} ; membrane also stained yellow.

Length of body 16 mm ; of wing 15 mm.

Holotype ♀. Congo : Semio, 20.ix.1913 (*Dr. Rodhain*) (MRAC).

CONGOMOCHTHERUS gen. n.

Type-species : *Congomochtherus lobatus* sp. n., by present designation.

The type-species bears a deceptive resemblance to *Machimus hirsutus* Ricardo, being generally black and grey, with distinctive reddish bands basally on the tibiae. *M. hirsutus*, however, is a true *Machimus*, with dorsocentral bristles extending forward of the transverse suture, and ovipositor flattened, bare, with free anal lamellae. *Congomochtherus* is distinguished by having the presutural dorsocentrals weak or absent, and by the spiny anal lamellae of the female (Text-fig. 73).

The male of *Congomochtherus* has an enlargement of the ninth sternite (hypandrium), which is quite different from the sclerotized process of the eighth sternite which is found in many *Machimus* (Text-fig. 74). In *Congomochtherus* the ninth sternite bears a brush or pencil of stiff black hairs, and in the species *lobatus* the sternite is extended posteriorly as a rounded lobe, which is yellow and of membranous appearance.

Congomochtherus is clearly allied to *Machimus* in facial and general structure ; the genitalia somewhat resemble those of *Neomochtherus*, which also has no presutural dorsocentrals, but the spiny lamellae of the ovipositor have no counterpart except in genera such as *Alcimus* and *Proctacanthus*, which are not close related to *Neomochtherus* and *Machimus*. Vein R_5 is distinctly angled in the middle, and the metanotal lobes bristly.

KEY TO SPECIES OF *CONGOMOCHTHERUS*

1 Legs entirely black, except for reddish rings at bases of tibiae only. Ninth sternite of male with yellow median lobe, as well as black bristles (Text-fig. 74) ; discal scutellar hairs black . . . . **lobatus** sp. n.

– Legs black except for reddish rings at bases of tibiae and of femora. Ninth sternite of male large, with black bristles, but with no median lobe. Discal scutellar hairs white . . . . **penicillatus** Speiser (p. 308).

Congomochtherus lobatus sp. n.

(Text-figs 73–75)

A predominantly black and grey species, the tibiae each with a distinct reddish ring basally, not extending along the dorsal surface.

♂ *Head*. Eyes close together, at vertex separated by little more than breadth of bases of antennae. Frons covered with brassy tomentum, which also covers ocellar tubercle, and with short, black, bristly hairs, including several on ocellar tubercle. Tomentum of face white, yellowish only on eye-margins ; moustache black above, white in middle and below ; facial tubercle half as high as face, well-defined. Upper occiput with strong black bristles ; bristles and hairs of lower occiput and buccae white. Antennae black, with black hairs : third segment as long as first two together ; arista as long as third segment, with microsegment and small apical style. Proboscis and palpi black with white hairs.

Thorax. Mesonotum entirely tomented : black, with dull yellowish patches behind humeri, extending into sublateral stripes ; posteriorly these stripes unite with lateral stripes above wing-bases. Scutellum dull black, inflated, with a recessed grey rim. Hairs and bristles black : dorsocentrals fairly strong posteriorly, but becoming weak or absent before reaching transverse suture : scutellum with two strong marginals. Pronotum with yellowish tomentum, white hairs and black bristles. Pleura covered with thick, ashy grey tomentum ; mesopleuron and sternopleuron showing areas of velvety grey, which shift according to the angle of the light.

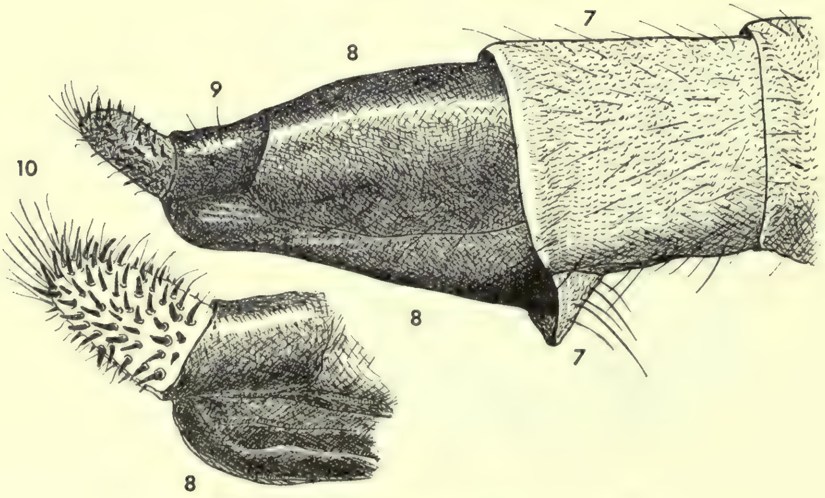
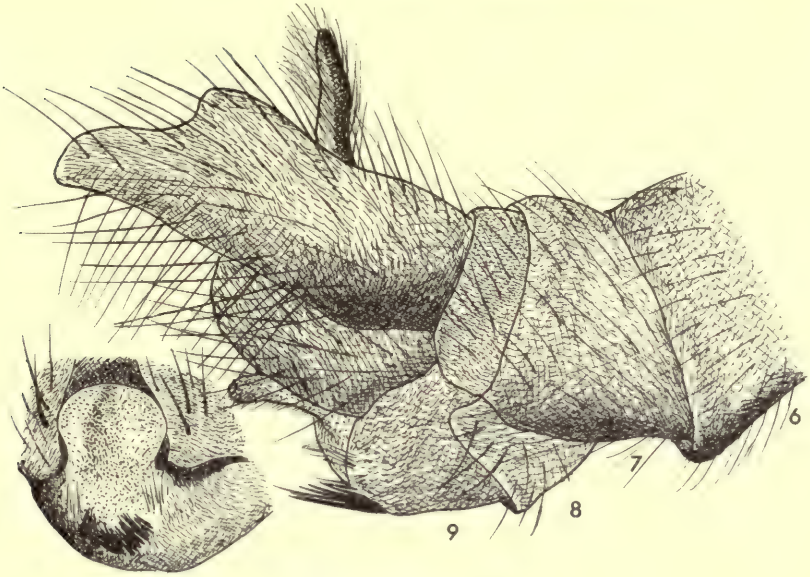
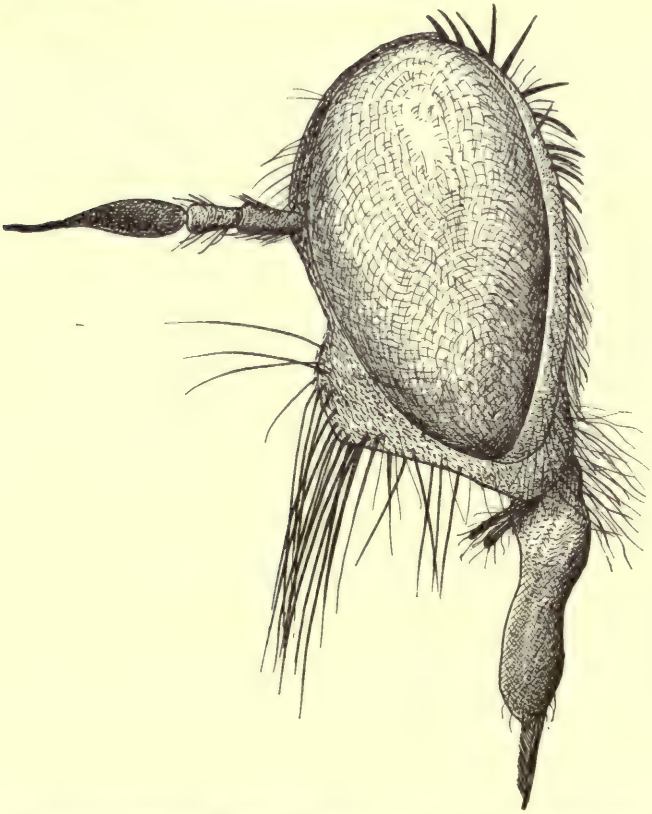


FIG. 73. *Congomochtherus lobatus*, ♀ genitalia.





FIGS 74–75. 74, *Congomochtherus lobatus*, ♂ genitalia. 75, *Congomochtherus lobatus*, head.

Hairs white, but some black bristles before halteres and on hypopygium.

Abdomen. Each tergite grey anteriorly, posteriorly and laterally, with a large, quadrate, dark brown spot. Hairs and bristles black on dark areas, white on grey areas. Venter grey, with hairs mostly white ; no strong ventral bristles. Male genitalia distinctive (Text-fig. 74) : ninth sternite has median, ovate, lobe, yellow, and lightly sclerotized ; immediately anterior to this lobe is a cluster of stiff, backwardly-facing, black bristles.

Legs. Black, except for a narrow, reddish or orange ring at base of each tibia. Clothing hairs white, bristles white and black.

Wings almost uniformly greyish, with microtrichiae in all cells ; marginal and first submarginal cells distinctly wrinkled. Halteres yellowish.

Length of body 14 mm ; of wing 10 mm.

♀ Closely similar ; ovipositor as in Text-fig. 73 ; eighth sternite extending backwards as a firm support beneath very spiny anal lamellae (tenth tergite).

Holotype ♂. N. NIGERIA : 1.v.1912 (*J. W. S. McFie*) (BMNH).

Paratypes. CONGO : Kalembelembe—Baraka, 2 ♂, 5 ♀, vii.1918 (*R. Mayné*) ; Manyama, 1 ♂ (*R. Mayné*) ; UELE : Aba, 1 ♂, 20.iv.1914 (*Dr. Rodhain*) ; Kapiri, 1 ♀, x.1912 (*Miss. Agric.*) ; TANGANIKA : Mpata, 780 m, 1 ♂, vii–viii.1953 (*H. Bomans*) ; KATANGA : Elisabethville, 1 ♂, ii.1929 (*Dr. Bequaert*) (MRAC).

Congomochtherus penicillatus (Speiser)[5]

Machimus penicillatus Speiser, 1910 : 100.

Distinguished from *lobatus* by the male genitalia and the leg-colouring. Ninth sternite well developed, and with a tuft of black bristles (as in Text-fig. 74), but lacking the yellow median lobe. Legs black with reddish rings at bases of tibiae, and at bases of femora as well.

This species bears an extraordinary resemblance to *Machimus hirsutus* (Ricardo), the scanty and ill-preserved type-material of which was collected on the Mara River in Kenya by Capt. A. O. Luckman ; yet *hirsutus* has neither the spiny lamellae of the female nor the extended ninth sternite of the male.

Recorded by Speiser from the lowlands surrounding Meru, Ngare na nyuki, and by Lindner (1955 : 40) from TANGANIKA : Ngaruka. KENYA : Narosswa R., 6 ♂, 2 ♀, 1912 (*W. P. Lowe*) ; Masai Reserve, between Guaso Nyeri and Narosswa, 1 ♂, 1 ♀, 23.ii.1914 (*Capt. A. O. Luckman*) ; Masai Reserve, Ngarenarok, 6000 ft, 1 ♀, 31.xii.1913 (*Capt. A. O. Luckman*) (BMNH). KIRI-KIRI : Nioka, fin 1 ♂, 1 ♀, 1913 (Régie des Mines). (MRAC).

HOPLOPHEROMERUS Becker

Hoplopheromerus Becker, 1925 : 241.

Tsacas and Oldroyd (1967) revised this genus, which has an interesting distribution in Africa and in the Far East. They described two new species from the Congo Basin, and discussed relationships with *Heligmoneura* and *Neomochtherus*.

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[5] While this paper was in the press, Dr. Tsacas has been kind enough to indicate to me certain specific differences between this species and one of the syntypes of *Machimus penicillatus* Speiser which he has been able to examine. It is possible, therefore that future study of the syntypical series, with selection of a lectotype, may require a renaming of the species recorded above as *penicillatus* Speiser.

MACHIMUS Loew

Machimus Loew, 1849 : 1. Type-species : *Asilus chrysitis* Meigen, 1820, by designation of Coquillet, 1910.

Tolmerus Loew, 1849 : 94. Type-species : *Asilus pyragra* Zeller, 1840, by designation of Coquillet, 1910.

Conosiphon Becker, 1923 : 36. Type-species : *Dysmachus pauper* Becker, 1907, by original designation.

Typical *Machimus* has a distinctive structure, though no item of this is exclusive to this genus. Even the question whether or not the dorsocentral bristles extend ahead of the transverse suture is debatable : in typical *Machimus* there are one or two strong presutural dorsocentrals, but not as many as in *Dysmachus*.

The ovipositor of *Machimus* has the anal lamellae simple and free, not inserted into the ninth tergite as in *Dysmachus*, and not spiny as in *Congomochtherus*. In the male it is the eighth sternite that is prominent, not the ninth as in *Congomocherus*, and this sternite is often drawn out into a conspicuous process (Text-fig. 76) : conversely, it may be without process (Text-fig. 77).

Machimus has the metanotal lobes of the thorax hairy or bristly, and vein R_5 of the wing has a more or less conspicuous kink. These two characters separate *Machimus* clearly from the *Neolophonotus*-group of genera, as well as from *Ommatius*.

The species fall fairly easily into two groups : *Machimus* (*sensu stricto*) with a ventral process in the males, and with four or more scutellar bristles ; and those species that have no ventral process, and only a single pair of scutellar bristles. The latter may conveniently be referred to the subgenus *Tolmerus*, though a formal separation of the two subgenera is difficult.

The *Machimus* of the Ethiopian Region are mainly located in eastern tropical Africa, perhaps as an offshoot from the Palaearctic Region.

KEY TO THE SPECIES OF *MACHIMUS* IN THE ETHIOPIAN REGION

1 Scutellum with 4–8 bristles 2
– Scutellum with only 2 bristles 5
2 Tarsi distinctly reddish yellow . . . . . . **gymnus** Oldroyd, 1939 : 40
– Tarsi black 3
3 Thorax excessively bristly : long, strong dorsocentrals extend to anterior margin of thorax ; four or five strong notopleurals . . . . **comans** Oldroyd, 1940 : 158
– Thorax not excessively bristly ; dorsocentrals extending only a little ahead of transverse suture, then becoming weaker. Only two strong notopleurals, with one or two finer bristles 4
4 Short hairs of scutellum black. Male with long central process (Text-fig. 76) (? *caudiculatus* Speiser) **ugandiensis** Ricardo, 1919 : 56 (p. 310)
– Short hairs of scutellum white (? *pammelas* Speiser, 1910 : 101) **juxta** Oldroyd, 1939 : 41
5 Legs entirely black, or with only a faint trace of red at bases of tibiae **nigripes** (Ricardo), 1922 : 62 (p. 310)
– Tibiae extensively red dorsally 6
6 Tarsi reddish yellow ; tibiae black towards tip . . . **rubripes** Ricardo, 1920 : 63
– Tarsi black : tibiae reddish only on dorsal surface . . **hirsutus** Ricardo, 1920 : 62

Machimus ugandiensis Ricardo

(Text-fig. 76)

Machimus ugandiensis Ricardo, 1919 : 56.

Ituri : Beni à Lesse, 4 ♂, 1 ♀, fin vi.1911 (*Dr. Martini*) ; Beni, 1 ♀ (*Lt. Bonnevie*); Beni, 2 ♀, x.1928 (*A. Collart*) ; Bunia, 1 ♀, vi.1928 (*P. Lefèvre*). Urundi ; Bururi, 1800–2000 m, 23 ♂, 17 ♀, 5/12.iii.1953 (*P. Basilewsky*) ; Ruanda : Gitarama, 1850 m, terr, Nyanza, 1 ♀, i.1953 (*P. Basilewsky*) ; Kisanyi, 2 ♂, xi.1951 (*A. E. Bertrand*) ; Lac Mohasi, 1 ♂, iv.1934 (*H. Hegh*). Kivu : Kisengni, 1 ♀ + 2 spec., 1953 (*R. Van Saceghem*) ; Kashusha, 1 ♂, 1 ♀, 1937 (*Vandelannoite*) ; Ngoma, 1 ♀, 3.x.1932 (*L. Burgeon*) ; Lulega, 1 ♂, 8.xi.1925 (*Dr. H. Schouteden*) ; Usumbura : 1 ♀ Bugarama, (*Dr. Henrard*) ; Rutschuru, 1 ♂, 1 ♀, 1.1928 (*Ch. Seydel*) ; Bukima, 1 ♀, iv.1948 (*J. V. Leroy*) ; Escarpment Kabasha, Chambi, 1 ♀, x.1933 (*Dr. de Wulf*) (MRAC).

Urundi : Bururi, alt. 1950 m, 20 ♂, 14 ♀, vi.–x.1948 ; Bubanza, colline Kagunuzi (Imbo), alt. 900 m, 1 ♂, 1 ♀, 21.vi.1955 ; Kitega, 1 ♀, iii.1957 (FJF).

Machimus nigripes (Ricardo)

(Text-fig. 77)

Tolmerus nigripes Ricardo, 1922 : 62.

Garamba National Park : P.N.G., 1458, II/fc/5, 4 ♂, 2 ♀, 27.iii.1951 ; 1494, II/fd/17, 5 ♂, 8 ♀, 4.iv.1951 ; 1506, II/gf/10, 1 ♀, 6.iv.1951 ; 1525, II/gf/4, 1 ♀,

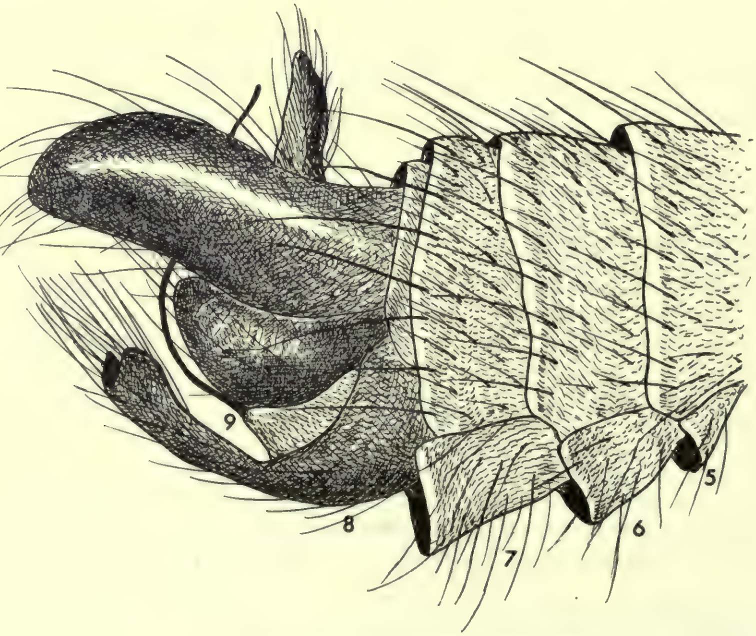


Fig. 76. *Machimus ugandiensis*, ♂ genitalia.

10.iv.1951 ; 1576, II/fb/4, 1 ♀, 19.iv.1951 ; 3450, Aka, 2 ♀, 14.v.1952 ; 3488, Inimvua, 1 ♀, 20.v.1952 ; 1671, II/fd/17, 1 ♀, 8.v.1950 ; 3476, Aka/2, 1 ♀, 19.v.1952 ; 3480, Inimvua, 1 ♂, 16.v.1952 ; 3583, Garamba/2 (source), 1 ♂, 6.vi.1952 ; 3656, PPSK, 5/3, 1 ♀, 20.vi.52 (IPNC).

KATANGA : Elisabethville, Kifumashi, sur herbes vivantes, 3 ♂, 2 ♀, 9.xii.55 (*M. Lips*) ; Elisabethville (piège Harris), 1 ♂, 1 ♀, xi.1935 (*P. Quarré*) ; Elisabethville, Lumbumbashi, 2 ♂, 1 ♀, 11.12.1928 (*Dr. M. Bequaert*) ; Elisabethville, 1 ♂, 1953 (*H. Bomans*) ; Elisabethville, 1 ♀ (*Miss. Agric.*) ; Lubudi, 1 ♀, viii–ix.1936 (*M. Prinz*) ; LUALABA : Kabada (Mutuka), 1 ♀, xii.1953 (*R. P. Th. de Caters*) ; Kolo-Kwilu-Madiata, 1 ♀, ix.1913 (*R. Verschuren*) ; Escarpment Kabash-Chiambi, 1 ♀, x.1933 (*Dr. de Wulf*) ; LOMAMI : Kmaina, 1 ♀, 1930 (*R. Massart*) ; UELE : Faradje, 1 ♀, 14.v.1914 (*Dr. Rodhain*) ; Bondo, Yakoma, 1 ♂, ix.1914 (*Dr. Rodhain*) ; Bambesa, 1 ♀, 25.viii.1933 (*J. V. Leroy*) ; La Kando, 1 ♂, Nov. 1925 (*Ch. Seydel*) (MRAC).

ASTOCHIA Becker

Astochia Becker, 1913 : 538. Type-species : *Astochia metatarsata* Becker, monotypic.

Typical specimens of *Astochia* are distinctive. The male genitalia are characteristically pendulant, with the upper forceps rather widely set apart from the lower forceps and claspers (Text-fig. 78). In the female the telescopic ovipositor incorporates the seventh to ninth segments, as in *Neoitamus*. Typically, in both sexes, the anterior basitarsus is swollen and very bristly.

Astochia closely resembles *Neoitamus* which, typically, can be easily separated from *Astochia* by the proclinate postoccipital bristles, the different male terminalia, and the normally developed basitarsi. These differences are shown clearly by the

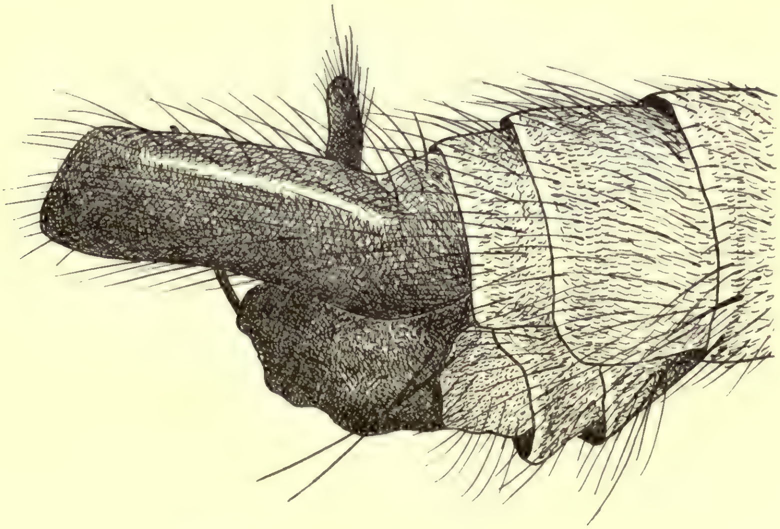


FIG. 77. *Machimus nigripes*, ♂ genitalia.

type-species of the two genera, *Astochia metatarsata* Becker of the Oriental Region, and *Neoitamus cyanurus* of the Palaearctic. The species of the Ethiopian Region do not fall so easily into the two genera, and the following assignments are provisional.

Astochia armata (Becker)

Neoitamus armatus Becker, 1910 : 22. Originally described from Voi, in KENYA.

GARAMBA NATIONAL PARK : P.N.G., 1461, II/fc/18, 2 ♀, 28.iii.1951 ; 415, I/a/1, 1 ♀, 20.iii.1950 (IPNC).

Astochia strachani sp. n.

(Text-fig. 78)

Distinguished by the leg-pattern, and by the characteristic male genitalia (Text-fig. 78). All femora are black on anterior face and dorsally, with a red ring basally, which is absent in related species *neavensis* Ricardo and *armatus* Becker ; posterior and ventral faces of femora reddish yellow.

♂ *Head*. Black, obscured by thick tomentum. Tomentum of frons brassy, including ocellar tubercle ; 2 long ocellar bristles and 2–4 small ones, as well as vertical row along each eye-margin, all black. Face with more brownish white tomentum ; facial tubercle low but long, ending abruptly about as far below antennae as length of first segment. Moustache black above, but mostly white ; no other hairs on face. Occipital bristles very strong, black, one or two slightly proclinate at tip ; occipital hairs and beard white. Antennae black, with black hairs. Palpi and proboscis black, with white hairs.

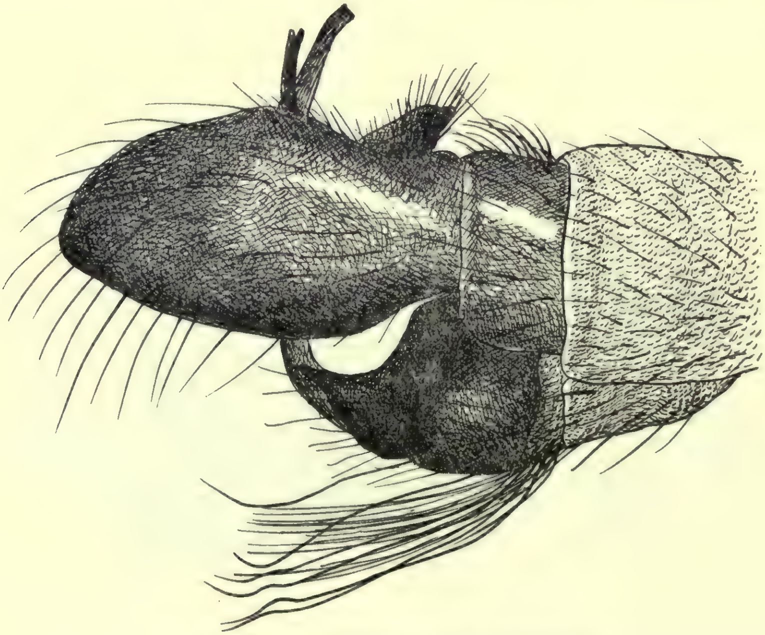


FIG. 78. *Astochia strachani*, ♂ genitalia.

Thorax. Mesonotum entirely tomented : brownish grey, with the usual partially divided median stripes, reaching back to scutellum, and lateral stripes interrupted at transverse suture ; clothed with short, bristly black hairs, and strong, black bristles. Scutellum entirely grey, with white hairs, and two marginal black bristles. Pronotum brownish grey, with rather weak bristles, some of which are black, and with white hairs. Pleura grey, a little more brownish dorsally : bristles black in front of halteres, mostly yellowish elsewhere.

Abdomen. Dorsum grey, each segment with a median brown spot and a pair of lateral ones which become larger posteriorly. Clothing hairs mostly black and bristly, white ones laterally ; each segment laterally with one or more strong white discal bristles, and on first tergite with a tuft of white hairs and a row or cluster of bristles, usually black. Venter brownish grey, with whitish hairs and bristles.

Legs. Coxae like pleura, with yellow or whitish hairs and bristles. Femora reddish yellow, posteriorly and ventrally, black anteriorly and dorsally, leaving a narrow reddish ring at base. Fore and middle tibiae and basitarsi reddish yellow, their tarsi otherwise dusky ; hind tibiae dull reddish, more dusky in apical half, all hind tarsal segments dusky. Close, velvety, bright yellow fringe on interior surface of fore tibia extends on to two basal segments of tarsus.

Wings. Narrow. pointed. Marginal cell (♂) broadened and ridged ; vein R_{4+5} sinous. Infuscation of cells back to fifth posterior, and a little in discal cell. Halteres yellowish.

♀ Closely similar, but marginal cell of wing not ridged.

Holotype ♂. NIGERIA : Lagos (*G. Strachan*) (BMNH).

Paratypes. Same data as holotype, 3 ♂, 2 ♀ (BMNH) ; SIERRA LEONE : Nzala, 1 ♀, 23.iii.62 (*M. F. Rushton*) ; COSTERMANSVILLE : Kasongo, 1 ♂, 3 ♀, viii–ix.1959 (*Dr. J. Claessens*) ; Kapiti, 2 ♂, 1 ♀, iv.1912 (*Miss. Agric.*) ; LOMAMI : Luputa, 1 ♂, ix.1935 (*Dr. Bomans*) ; KATANGA : Elisabethville, route Sakania, 1 ♂, 21.viii.1952 (*L. Remy*) (MRAC).

NEOITAMUS Osten-Sacken

Itamus Loew, 1849 : 84 [Praeocc. Coleoptera]. Type-species : *Asilus cyanurus* Loew, 1849, by designation of Coquillet, 1910.

Neoitamus Osten-Sacken, 1878 : 82, 235.

Comments have already been made, under *Astochia*, about the difficulty of separating the two genera *Astochia* and *Neoitamus*. The following species seems more likely than the others to be properly placed in *Neoitamus*.

Neoitamus africanus Ricardo

Neoitamus africanus Ricardo, 1919 : 73. Originally described from Mt Kenya.

STANLEYVILLE : Mahagi-Niarembe, 1 ♀, x.1935 (*Ch. Scops*) ; KIVU : Kisenyi, 1 ♀, ii.1928 (*Ch. Seydel*) ; Muturak 1 ♀, 3.ii.1922 (*van Sacaghem*) ; RUANDA : Kisenyi, 1800 m, 1 ♂, 18.xi.1961 (*A. E. Bertrand*) (MRAC).

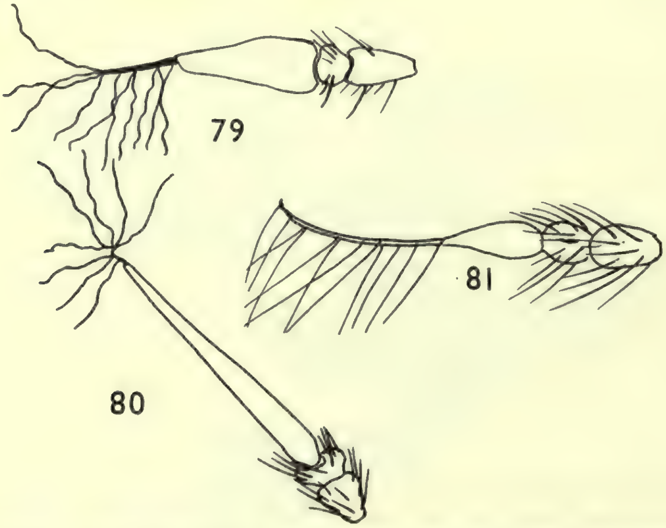
Tribe **OMMATIINI**

Members of this tribe are characterized by the plumed antennae, which have a ventral fringe of long hairs on the arista (Text-figs 79–81). It might be doubted whether this single character is sufficient to define a tribe, but the few genera comprised in Ommatiini are distinctive even when the antennae are broken. Hull

(1962 : 433) regards the chitinized postmetacoxal arch as a tribal character. These genera have much in common with certain genera of Asilini, notably *Neomochtherus* and *Heligmoneura*, but recognition of Ommatiini as a tribe is convenient.

In the genus *Ommatius* Wiedemann the antennae are similar to those of Asilini, with short, seedlike third segment, but with the addition of a ventral fringe on the arista. *Cophinopoda* Hull, 1958 segregates a small group of species that are distributed from Madagascar eastwards to China and Queensland. *Michotamia* Macquart, 1838 (*Allocotosia* Schiner, 1866) comprises a number of Oriental and Australian species which are characteristically either yellow or purple in colour, and in which the third antennal segment itself is elongate, with correspondingly shorter, fringed arista (Text-fig. 80). A single species from the Congo, described in the present paper, seemed at first to be the only African representative of *Michotamia*, but it later proved to be a new genus *Thallosia*, differing from *Michotamia* in the genitalia (which resemble those of *Cophinopoda*), and in having antennae that are intermediate between those of *Michotamia* and those of *Ommatius* (Text-fig. 79).

The genus *Ommatius* is one of the most difficult genera of Asilidae, in spite of the complex genitalia of many of the species. About fifty species occur in Africa south of the Sahara, and what is known of their distribution suggests that some species at least may occur over a wide area. For these reasons the present report of this genus has been confined to the species of *Ommatius* that actually occur within the Parc National du Garamba, leaving the larger and more diversified collection of *Ommatius* from the rest of the Congo Basin to form part of a projected revision of the African species of *Ommatius*, to be made at a later date.



FIGS 79–81. Tribe Ommatiini, antennae. 79, *Thallosia* ; 80, *Michotamia* ; 81, *Ommatius*.

THALLOSIA gen. n.

Type-species : *Thallosia congoicola* sp. n., by present designation.

Differs from the varied assortment of species of *Ommatius* in the head structure as a whole. Antennae as in Text-fig. 79, with the third segment and arista about equal in length to each other, and to the first two segments combined. Face with a distinct but small tubercle, occupying less than half of face, and bearing a sparse moustache of only a few strong bristles (Text-fig. 82). Occipital bristles strong, but few in number ; beard unusually sparse. Proboscis long, spade-like (i.e. dorsoventrally flattened) and arising from a stout base, which bears a small clump of strong bristles ventrally. Palpi cylindrical, with fine hairs.

Thorax with a strongly developed pronotum, with distinct ' collar '. Scutellum rather small, with a deep transverse furrow on its disc, and another immediately before scutellar suture. Male genitalia of the unique species remarkably like those of *Cophinopoda*, distinguished by the long, curved appendage to the upper forceps (epandrium) (Text-fig. 83).

Legs slender, without special features ; pulvilli square at tip as in *Michotamia*. Wings rather broadly rounded at tip. Vein R_4 ending at, or shortly behind, wing-tip.

Thallosia congoicola **sp. n.**

(Text-figs 82, 83)

A mainly yellow species with distinctly patterned thorax. Male genitalia as in Text-fig. 83.

♂ *Head* black in ground colour, frons with dark brown tomentum, including ocellar tubercle, but a small yellow patch just in front of this tubercle. Two black postocellar bristles, and a very few small frontal bristles, black. Face entirely covered with tomentum, which is whitish, a little brownish beneath antennae. Moustache confined to facial tubercle, consisting of only a few white hairs and bristles, and one or two black bristles dorsally. Extensive clypeal region (Text-fig. 82) bare, shining brown. Palpi cylindrical, shining black-brown, with yellowish hairs. Proboscis shining black, with a conspicuous clump of brown hairs ventrally near base. Antennae entirely yellow-brown with black bristles. Upper occiput with strong, moderately long, yellow bristles ; lower occiput with fine yellowish hairs, beard pale, unusually sparse.

Thorax entirely tomented. Mesonotum golden brown with a distinct pattern of darker brown, consisting of two widely separated longitudinal stripes, which end in middle of scutum and are succeeded by a single median stripe, and flanked by three well defined lateral spots. Scutellum yellowish brown, with sparse, stout yellow hairs but no marginal bristles. A few very strong black thoracic bristles : 2 notopleural, 1 supra-alar, 1 postalar, and one dorsocentral well ahead of scutellar suture ; only a few, sparse very fine black hairs aligned as dorsocentrals and acrostichals. Pleura covered with yellow tomentum, but bare of hairs except for a strong pteropleural bristle and weak bristles ahead of halteres.

Abdomen dorsally reddish brown, without pattern, but more yellow basally, especially on second segment. Hairs black dorsally, yellow laterally ; hind margins of segments with longer, slender bristles, and laterally with at least one, quite strong, yellow bristle. Venter reddish yellow, with yellowish hairs. Male genitalia as in Text-fig. 83 ; upper forceps with long, curved process, recalling that found in *Cophinopoda* (Oldroyd, 1964).

Legs slender, entirely reddish yellow, except for slight darkening of last tarsal segment. Hind femora ventrally with a row of six short, black bristles.

Wings slightly and uniformly smoky. Marginal cell with a very short stalk ; stalk of fourth posterior cell long. Halteres reddish yellow.

Length of body 8 mm ; of wing 8 mm.

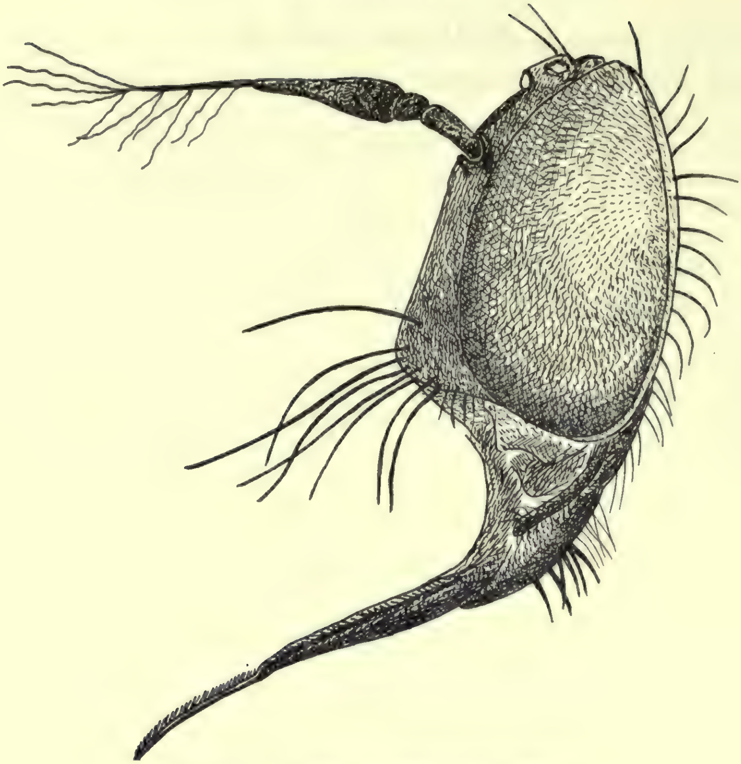


FIG. 82. *Thallosia congoicola*, head.

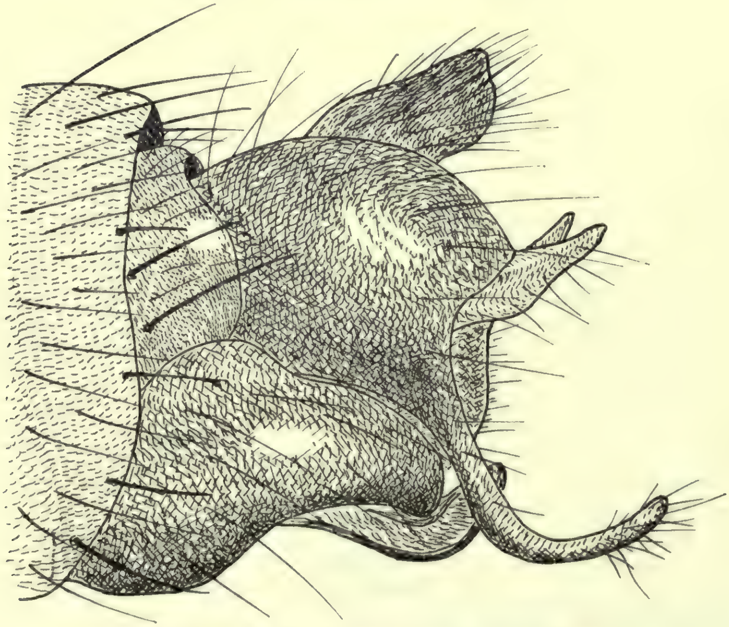


FIG. 83. *Thallosia congoicola*, ♂ genitalia.

Holotype ♂. Garamba National Park : P.N.G., 54, I/o/1, 10.v.1950 (IPNC).
Paratype ♀. Uele : van Kerkovenville (*Degreef*) (MRAC).

OMMATIUS Wiedemann

Ommatius Wiedemann, 1821 : 213. Type-species : *Asilus marginellus* Fabricius, 1781, by designation of Coquillet, 1910.

Ommatinus Becker, 1925 : 84. Type-species : *Ommatius pinguis* Wulp, 1872, by original designation.

This genus originally contained only three species, *marginellus* Fabricius, *auratus* Fabricius and *fulvidus* Wiedemann. The two last have been removed to other genera, *auratus* to *Michotamia* and *fulvidus* to *Cophinopoda*. The type-species, *marginellus*, is one of a great range of tropical species of *Ommatius* which can only be resolved by a more detailed study. The following are merely the species taken by the Mission H. De Saeger in the P. N. du Garamba.

Ommatius vittatus Curran

(Text-figs 84, 85)

Ommatius vittatus Curran, 1927 : 13.

There is a complex of species related to *O. variabilis* Engel, and notable for the swollen hind femora of the males (Text-fig. 84). The exact number of species involved is obscure, but the present material clearly belongs to *vittatus* Curran, and should be known by that name until a study of the whole genus is possible.

Garamba National Park : P.N.G., 261, I/b/3, 1 ♀, 1.iii.1950 ; 469, I/a/1, 1 ♀, 1.v.1950 (*G. Demoulin*) ; 457, I/3/3, 1 ♀, 8.v.1950 ; 585, I/a/M, 1 ♂, 2 ♀, 7.xi.1950 (*G. Demoulin*) ; 789, Napukumweli, 1 ♀, 26.viii.1950 (*G. Demoulin*) ; 998, I/I/d, 1 ♀, 21.xii.1950 (*J. Verschuren*) ; 1458, II/fc/5, 1 ♂, 27.iii.1951 ; 1525, II/gf/4, 1 ♀, 10.iv.1951 ; 1527, II/gd/4, 1 ♂, 2 ♀, 13.iv.1951 ; 1576, II/CH/4, 2 ♂, 1 ♀, 19.iv.1951 (*J. Verschuren*) ; 1588, II/hc/4, 1 ♀, 20.iv.1951 (*J. Verschuren*) ; 1645, II/gc/11, 1 ♀, 4.v.1951 ; 1798, II/fd/15, 2 ♂, 1 ♀, 24.v.1951 ; 1824, II/fd/17, 1 ♀, 28.v.1951 ; 1872, II/hc/8, 1 ♂, 5.vi.1951 ; 1886, II/gc/6, 1 ♂, 1 ♀, 8.vi.1951 ; 1920, II/gd/8, 1 ♀, 16.vi.1951 ; 2015, II/gc/6, 3 ♂, 4 ♀, 29.vi.1951 ; 2024, II/gd/14, 1 ♂, 30.v.1951 ; 2056, II/fd/17, 1 ♀, 9.vii.1951 ; 2072, II/fd/6, 1 ♀, 13.vii.1951 ; 2158, II/gc/8, 4 ♀, 27.vii.1951 ; 2225, II/fd/15, 2 ♀, 7.viii.1951 ; 2243, II/gc/6, 1 ♂, 9.viii.1951 ; 2290, II/fd/6, 1 ♂, 1 ♀, 23.viii.1951 ; 2361, II/gc/13s, 1 ♂, ix.1951 ; 2395, II/fd/18, 1 ♂, 8.ix.1951 ; 2448, II/gd/7, 1 ♀, 20.iv.1951 ; 2456, II/fd/15, 8 ♂, 2 ♀, 21.ix.1951 ; 2521, II/gc/11, 2 ♂, 3 ♀, 5.x.1951 ; 2575, II/fc/6, 1 ♂, 10.x.1951 ; 2653, II/fc/18, 1 ♂, 12.x.1951 ; 2699, II/fc/6, 4 ♀, 30.x.1951 ; 2740, II/gd/9, 1 ♀, 8.xi.1951 ; 2774, II/fc/135, 1 ♂, 21.xi.1951 ; 2506, II/fc/18, 1 ♂, 1 ♀, 24.xi.1951 ; 2881, II/fc/14, 1 ♀, 10.xii.1951 ; 2935, II/fd/10, 2 ♀, 20.xii.1951 ; 2941, II/fc/6, 7 ♂, 14 ♀, 26.xii.1951 ; 3287, II/gc/6, 2 ♂, 9 ♀, 5.iv.1952 ; 3399, II/gc/11, 3 ♂, 1 ♀, 29.iv.1952 ; 3424, II/fd/7, 1 ♀, 5.v.1952 ; 3429, II/fd/18, 1 ♀, 6.v.1952 ; 3567, II/hd/6, 4 ♂, 9 ♀, 30.v.1952 ; 3623, Iso II/2, 1 ♀, 18.iv.1952 ; 3656, PPSK 5/3, 1 ♂, 20.vi.1952 ; 3678, Ndelele/4, 1 ♂, 18.vi.1952 ; 3729, II/fc/7, 1 ♂, 2 ♀, 4.vii.1952 ; 3811, Utukura/4, 1 ♀, 22.vii.

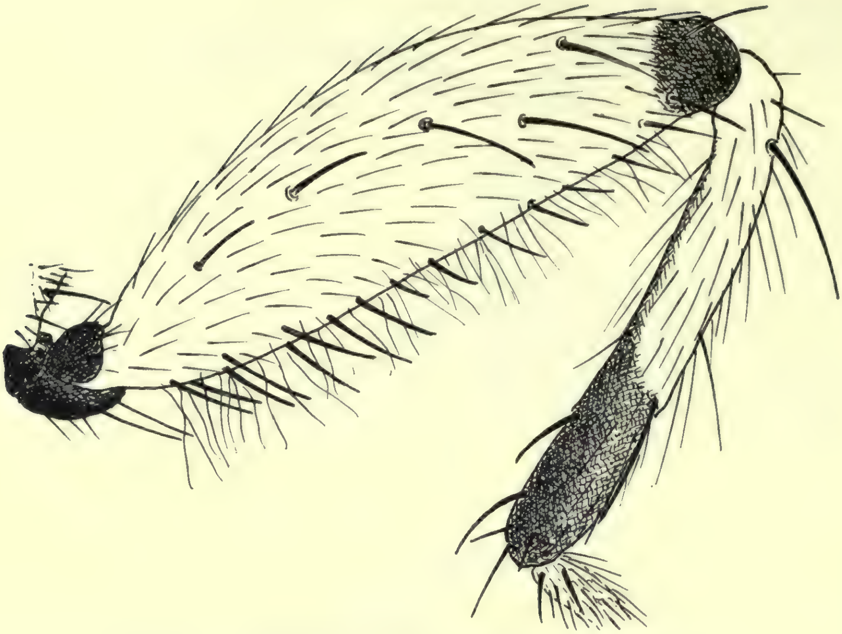


FIG. 84. *Ommatius vittatus*, ♂ hind femur and tibia.

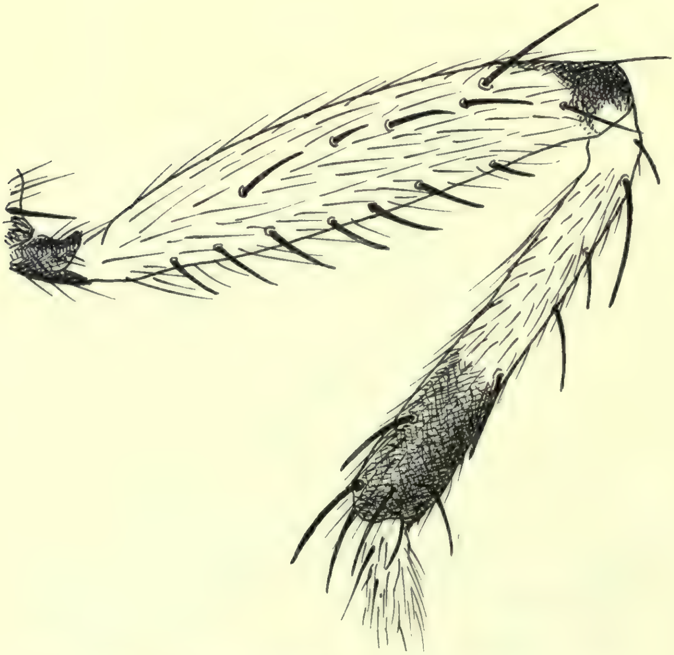


FIG. 85. *Ommatius vittatus*, ♀ hind femur and tibia.

1952 ; 3844, Mt. Moyo, 1 ♂, 29.vii.1952 ; 3963, II/gc/6, 1 ♂, 21.viii.1952 ; 3964, II/gd/4, 1 ♂, 22.viii.52 ; 3878, II/gc/10, 1 ♂, 4.viii.1952 ; 3884, II/fd/12, 1 ♂, 5.viii. 1952 ; 3940, II/gc/7, 1 ♂, 1 ♀, 14.vii.52 ; 3952, II/gd/6, 2 ♀, 19.viii.52 ; 4042, II/gc/8, 1 ♀, 9.ix.1952 ; 4057, II/gc/7, 1 ♀, 16.xi.1952 (IPNC).

Ommatius macroscelis Bezzi

Ommatius macroscelis Bezzi, 1906 : 292 (*Ditterei Eritrei*) ; Oldroyd, 1939 : 433 ; Lindner, 1955 : 44.

This is a very distinctive little species, easily recognized by its black colour, with white tomentum on pleura and dorsally on abdomen, especially in the male. The most characteristic feature is the row of short, mostly black, spines ventrally on the hind femora.

Garamba National Park : P.N.G., 63, I/b/3, 1 ♂, 21.xii.1949 ; 308, Mt. Ndogo, 1 ♂, 1 ♀, 15.iii.1950 ; 422, I/a/3, 6 ♂, 4 ♀, 17.iv.1950 (*G. Demoulin*) ; 441, Akam, 2 ♂, 21.iv.1950 ; 456, I/b/1, 1 ♂, 1 ♀, 12.iv.1950 ; 467, I/b/1, 1 ♂, 1 ♀, 26.iv.1950 (*G. Demoulin*) ; 479, I/o/1, 1 ♂, 4.v.1950 (*G. Demoulin*) ; 483, I/a/1, 2 ♂, 2 ♀, 5.v. 1950 (*G. Demoulin*) ; 529 Akam, 1 ♂, 19.vii.1950 ; 508, I/o/1, 1 ♀, 7.ix.1950 (*G. Demoulin*) ; 999, II/c, 1 ♀, 21.xii.1950 (*J. Verschuren*) ; 1494, II/fd/17, 1 ♂, 4.iv. 1951 ; 1537, II/gc/7, 2 ♂, 14.iv.1951 ; 1566, II/gd/4, 1 ♂, 17.iv.1951 (*J. Verschuren*) ; 1576, II/fb/4, ♂♀, 19.iv.1951 (*J. Verschuren*) ; 1588, II/fc/4, 3 ♂, 2 ♀, 20.iv.1951 (*J. Verschuren*) ; 1590, II/fc/4, 3 ♂, 2 ♀, 20.iv.1951 (*J. Verschuren*) ; 1590, II/ c/4, 2 ♂, 2 ♀, 20.iv.1951 (*J. Verschuren*) ; 1613, II/hc/4, 1 ♂, 24.iv.1951 (*J. Verschuren*) ; 1618, II/gd/4, 2 ♂, 2 ♀, 25.iv.1951 (*J. Verschuren*) ; 1645, II/gc/11/ 3 ♂, 2 ♀, 4.v. 1951 ; 1671, II/fd/17, 1 ♂, 8.v.1951 ; 1700, II/gd/8, 1 ♂, 1 ♀, 9.v.1951 ; 1772, II/fc/17, 11 ♂, 5 ♀, 22.iv.1951 ; 1811, II/fb/11, 1 ♂, 1 ♀, 25.v.1951 (*J. Verschuren*) ; 1824, II/fd/17, 2 ♀, 28.v.1951 ; 1855, II/gc/4, 1 ♂, 3 ♀, 1.vi.1951 ; 1866, II/hc/8, 1 ♀, 4.vi.1951 ; 1867, II/gc/6, 1 ♂, 1 ♀, 4.vi.1951 ; 1876, II/gd/14, 2 ♂, 6.vi.1951 ; 1886, II/gc/6, 1 ♀, 8.vi.1951 ; 1887, II/gd/7, 2 ♂, 2 ♀, 8.vi.1951 ; 1919, II/gd/8, 2 ♂, 3 ♀, 16.vi.1951 ; 2015, II/gc/6, 3 ♀, 29.vi.1951 (*J. Verschuren*) ; 2052, II/gd/4, 2 ♂, 1 ♀, 5.vii.1951 ; 2055, II/gd/4, 1 ♀, 6.vii.1951 ; 2496, II/nd/4, 1 ♂, 2.x.1951 ; 2615, PpK. 52g, 2 ♂, 1 ♀, 16.x.1951, II/gc/9, 2 ♀, 20.x.51 ; 2860, PpK. 90/115, 1 ♂, 3.xii.1951 ; 2653, II/fc/18, 1 ♂, 12.x.1951 ; 2668, II/fd/4, 2 ♂, 1 ♀, 24.x.1951 ; 2680, PpK/55, 1 ♂, 3 ♀, 26.x.1951 ; 2697, II/fd/16, 1 ♂, 1 ♀, 29.x.1951 ; 2699, II/fc/6, 1 ♂, 30.x.1951 ; 2708, II/id/8, 2 ♂, 31.x.1951 ; 2724, PpK.80.90., 12 ♂, 11 ♀, 5.xi.1951 ; 2731, II/gd/4, 7.xi.1951 ; 2757, II/gc/11, 2 ♂, 13.xi.1961 ; 2773, PpK/55, 2 ♂, 19.xi.1961 ; 2774, II/gc/13s, 1 ♂, 21.x.1951 ; 2780, II/gd/4, 1 ♀, 23.xi.1951 ; 2806, II/fc/18, 8 ♂, 10 ♀, 24.xi.1951 ; 2814, II/fd/16, 2 ♂, 28.xi.1951 ; 2818, II/fc/17, 2 ♂, 1 ♀, 29.xi.1951 ; 2831, II/gd/4, 1 ♀, 30.xi.1951 ; 2860, PpK, 90/115, 1 ♂, 3.xii.1951 ; 2881, II/fc/14, 1 ♂, 3 ♀, 10.xii.1951 ; 2882, II/gc/10, 1 ♀, 11.xi.1951 ; 2910, II/fd/17, 3 ♂, 2 ♀, 14.xii.1951 ; 2917, II/gc/15, 1 ♂, 3 ♀, 17.xii. 1951 ; 2935, II/fd/10, 3 ♂, 2 ♀, 20.xii.1951 ; 2939, II/fd/18, 1 ♀, II/fd/18 ; 2941, II/fc/6, 1 ♂, 1 ♀, 26.xii.1951 (*J. Verschuren*) ; 3262, II/fc/18, 1 ♀, 31.iii.1952 ; 3311, PpK 73/d/9, 2 ♂, 2 ♀, 8.iv.52 ; 3399, II/gc/11, 2 ♂, 1 ♀, 29.iv.1952 ; 3410, II/gd/4, 2 ♂, 2 ♀, 2.v.1962 ; 3424, II/fd/7, 1 ♂, 5.v.1952 ; 3429, II/fc/18, 1 ♀, 8.v.

1952 ; 3461, Inimvua, 1 ♀, 16.v.1952 ; 3476, Aka/2, 2 ♀, 19.v.1952 ; 3480, Inimvua, 1 ♂, 16.v.1952 ; 3514, Aka/2, 1 ♀, 22.v.1952 ; 3964, II/fd/4, 1 ♀, 3.vi.1952 ; 3701, II/gd/1, 1 ♀, 24.vi.1952 ; 4100, Iso III, 1 ♂, 26.ix.1952 (IPNC).

Ommatius macquarti Bezzi

(Text-fig. 86)

Ommatius macquarti Bezzi, 1908 : 379.

Easily recognized by the bulbous male genitalia (Text-fig. 86), but extremely variable in size and general stature.

Garamba National Park : P.N.G., 213, I/2/3, 1 ♂, 20.ii.1950 ; 414, I/b/3, 1 ♂, 414, I/b/3, 1 ♂, 14.iv.1950 ; 529, Akam, 1 ♀, 19.v.1950 ; 1890, II/fd/17, 1 ♀, 11.vi. 1951 ; 1916, II/fd/1, 1 ♂, 15.vi.1951 ; 1960, II/fd/17, 1 ♀, 25.vi.1951 (IPNC).

The collection of the Musée R. de l'Afrique centrale contains many examples of this species, which will be considered later in a generic revision.

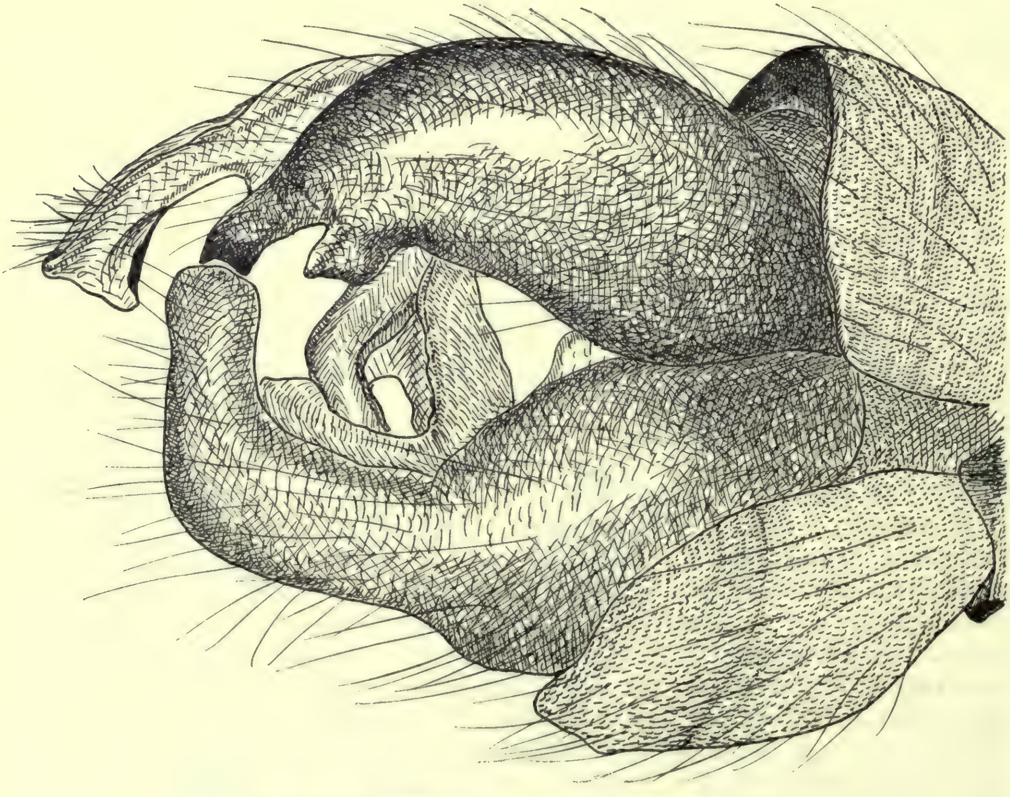


Fig. 86. *Ommatius macquarti*, ♂ genitalia.

Ommatius digittatus sp. n.

(Text-figs 87–89)

A small, delicate species, with slender abdomen and yellow legs ; distinguished in the male by the characteristic genitalia (Text-fig. 87).

♂ *Head.* Eyes rather widely separated. Frons entirely covered with dark chocolate-brown tomentum, with several long, proclinate, black occipital bristles, and with long black hairs along eye-margins. Face with dense yellow tomentum, only slightly rounded in profile, without any distinct tubercle ; moustache with white or yellowish hairs and bristles near mouth-margin, and continued up to bases of antennae by a double row of black bristles, flanked with slender black hairs. Antennae black, with some black and some yellow hairs and bristles ; third segment short, little longer than first. Occipital bristles black and strongly proclinate ; lower occipital bristles and beard yellowish.

Thorax. Mesonotum entirely tomented, without definite pattern, though anteriorly and medially it is darker than postero-laterally. Thoracic bristles longer than usual, mostly yellow ; 2 notopleural, 1 supra-alar, sometimes one or two dorsocentrals ; fine hairs in positions of dorsocentrals, acrostichals, humeral and lateral areas are also exceptionally long and fine, longer than total of three antennal segments. Scutellum grey, with long, curved yellow hairs on disc, and several bristly yellow hairs, but no strong bristles, on margin. Pronotum and pleura grey, with entirely yellow hairs and bristles ; bristles are present on pronotal collar, and before halteres, and in a vertical row on posterior margin of mesopleuron.

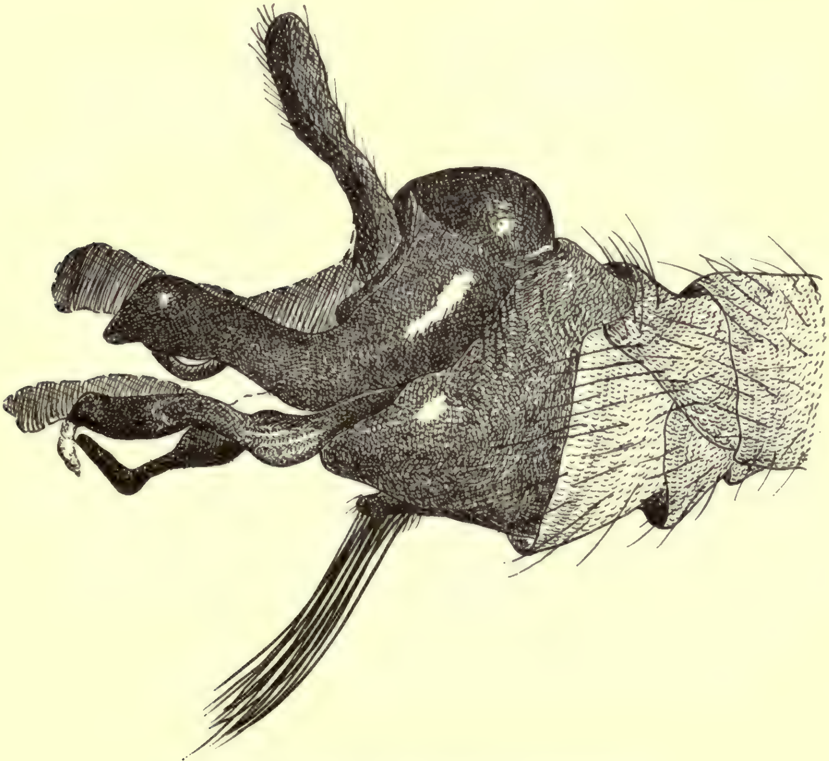


FIG. 87. *Ommatius digittatus*, ♂ genitalia.

Abdomen. Tergites densely covered with velvety tomentum, which alters in tone according to the direction of the light, and almost conceals dull yellow hind margins of segments. Hairs entirely golden yellow, longer and more bristly laterally, with a clump of strong yellow bristles on each side of first segment. Sternites yellowish grey, with a few fine hairs, but with an array of strong yellow bristles in a characteristic pattern (Text-fig. 89). From seventh sternite onwards abdomen is darker brown both dorsally and ventrally, and ends in very distinctive male genitalia (Text-fig. 87).

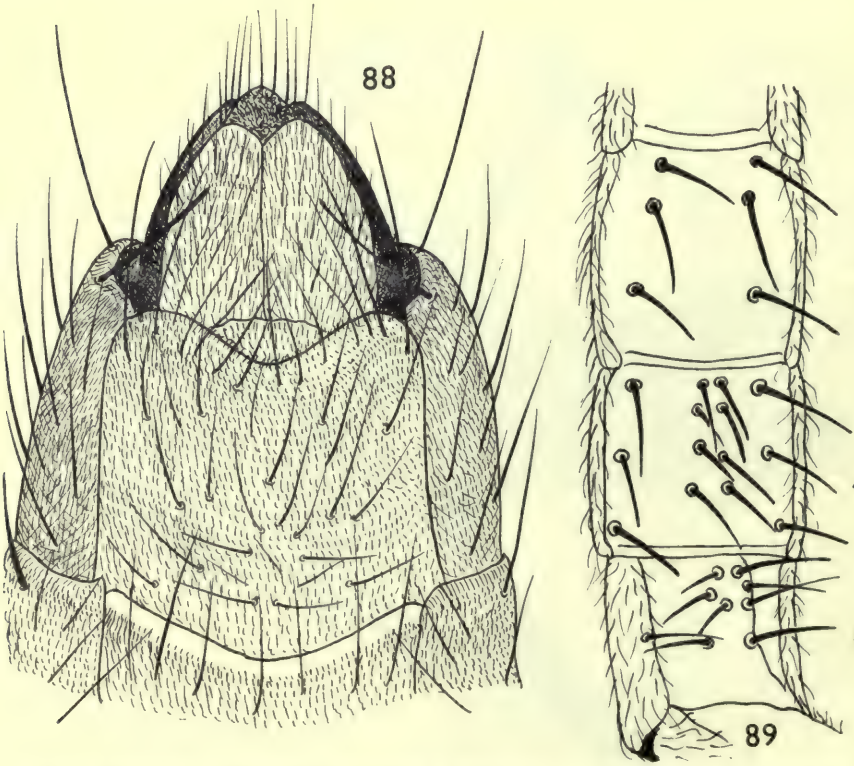
Legs. Coxae and trochanters black with grey tomentum. Legs otherwise clear yellow down to tip of basitarsus ; rest of tarsi black. Hairs and bristles long, slender, entirely yellow except towards tips of tarsi, where short bristles are black.

Wings. Very narrow and elongate ; radial fork bell-mouthed, straddling wing-tip ; fourth posterior cell with long petioles both basally and apically. Halteres pale yellow knob on a grey stalk.

Length of body 9 mm ; of wing 5 mm.

♀ Generally resembles male, except that sternites lack the pattern of strong bristles ; tergites with one strong yellow bristle on each side, in posterior angle ; ♀ genitalia as in Text-fig. 88.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 4103, Mabanga, 29.ix.1952 (IPNC).



FIGS 88–89. 88, *Ommatius digittatus*, ♀ genitalia ; 89, *Ommatius digittatus* ♂, abdominal sternites with bristles (cf. fig. 93).

Paratypes. P.N.G., 1 ♂, 1 ♀, 26.iv.1950 (*G. Demoulin*) ; 497, I/a/3, 1 ♂, 8.v.1950 ; 657, I/O/1, 1 ♀, 30.iii.1950 (*G. Demoulin*) ; 812, I/o/1, 1 ♀, ii.ix.1950 (*G. Demoulin*) ; 866, I/o/2, 2 ♂, 1 ♀, 3.x.1950 (*G. Demoulin*) ; 898, I/o/2, 1 ♂, 20.x.1950 ; 2479, II/gc/6, 1 ♀, 27.ix.1951 ; 2554, II/fd/18, 1 ♀, 8.x.1951 ; 2680, PpK/35, 1 ♀, 28.x. 1951 ; 2699, II/fc/6, 1 ♂, 1 ♀, 30.x.51 ; 3197, Anie /9, 1 ♂, 1 ♀, 18.iii.1952 ; 3399, II/gc/11, 1 ♂, 1 ♀, 29.iv.1952 ; 3583, Garamba/2 (source), 1 ♀, 6.v.1952 ; 3589, Ndelele/2, 1 ♀, 6.vi.1952 ; 3678, Ndelele/4, 2 ♂, 2 ♀, 18.vi.1952 ; 3743, II/gd/4, 1 ♀, 5.vii.1952 ; 3763, II/fd/17,. 1 ♂, 9.vii.1952 ; 4101, Pali /8, 2 ♂, 2 ♀, 27.ix.1952 (IPNC).

Ommatius garambensis sp. n.

(Text-fig. 90)

Apparently one of the *vittatus-variabilis* group of species, but distinguished from others by the male genitalia (Text-fig. 90), with the square-tipped upper forceps, and by the colour of the femora, which are black with a dorsal or postero-dorsal reddish stripe.

♂ *Head.* Frons and face relatively broad, narrowest at vertex, broadest at mouth-margin. Frons with brassy brown tomentum over a black ground ; ocellar tubercle shining black dorsally, with short black hairs on each side ; a single pair of black postocellar bristles on each side ; a single pair of black ocellars. Tomentum of frons paler, more yellowish ; facial tubercle occupying lower third of face, with a strong moustache of mainly black bristles, with white hairs and bristles on mouth-margin. Antennae black, with black hairs and bristles ; proboscis and palpi black with whitish hairs. Upper occipital bristles strong and black, lower occiput and beard with white hairs.

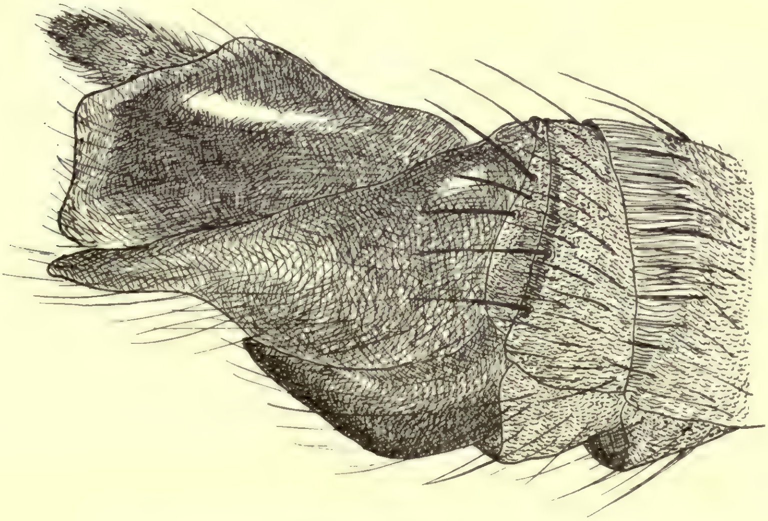


FIG. 90. *Ommatius garambensis*, ♂ genitalia.

Thorax. Mesonotum with ashy grey and brown tomentum, giving a moderately distinct pattern of two longitudinal stripes and two lateral spots on each side. Bristles and hairs black : 2 notopleurals, 1 supra-alar, 3–6 dorsocentrals ; fine black hairs along lines of dorsocentrals and acrostichals, spreading into large lateral areas above wings. Scutellum uniformly yellowish grey, with pale discal hairs, and two strong black marginal bristles. Pronotum and pleura with grey tomentum. Pronotum with a collar of black bristles ; one strong black pteropleural bristle, and a vertical row of black bristles before halteres ; mesonotum unusually hairy, with long, fine, black hairs.

Abdomen. Tergites with dull yellow posterior margins ; clothed with short, black hairs, which become yellowish and longer laterally ; no distinct strong bristles except on first tergite. Sternites similar, hairs pale.

Legs. Coxae black in ground colour, with grey tomentum and white hairs ; middle and hind coxae each with a single, strong, yellow bristle externally. Femora black, with a dorsal reddish stripe, which may extend into an apical ring, and on to ventral surface, especially on fore and middle femora. Clothing hairs of femora black anteriorly on fore and middle legs, white posteriorly, and on entire hind femora. Fore femora without strong bristles ; middle and hind femora with very strong black bristles on anterior face, and in a ventral row on hind femora. Fore and middle tibiae and tarsi reddish yellow, with black tips to segments ; hind legs with only basal half of tibiae reddish yellow ; rest, including entire tarsi, black. Bristles mixed black and yellow.

Wings uniformly pale greyish ; marginal cell a little ridged, but not strongly dilated on costal margin ; radial fork bell-mouthed, vein R_4 ending distinctly before wing-tip. Halteres brown.

Length of body 14 mm ; of wing 11 mm.

♀ Generally similar, but larger areas of reddish colour on legs.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 3277, PpK, 51/g/a, 2.iv.52 (IPNC).

Paratypes. Same data as holotype, 6 ♂, 3 ♀ ; 808, I/o/1, 7.ix.1950 (*G. Demoulin*); 2056, II/fd/17, 1 ♀, 9.vii.1961 ; 2242, II/fd/17, 1 ♀, 13.viii.1951 ; 2341, II/fd/17, 1 ♀, 31.viii.1951 ; 2814, II/fd/16, 1 ♀, 28.xi.1951 ; 2839, II/fd/18, 1 ♀, 21.xii.1951 ; 3262, II/fc/18, 1 ♂, 31.iii.1952 (IPNC).

Ommatius caligula **sp. n.**

(Text-figs 91–93)

Superficially resembling *digittatus* sp. n., but distinguished in both sexes by the genitalia, and in the males by the arrangement of strong bristles on sternites 3, 4, 5 of the abdomen (Text-fig. 93). From *drusus* sp. n., both *digittatus* and *caligula* are distinguished by having the femora and tibiae entirely reddish yellow.

♂ *Head.* Eyes rather widely separated. Frons dark velvety brown, with slender, black hairs on ocellar tubercle, and along eye-margins. Face gently rounded, without definite tubercle, densely covered with yellow tomentum. Moustache extensive, covering most of face, and extending almost to bases of antennae ; rather sparse, composed of a mixture of black and yellow bristles and hairs. Antennae black, with velvety brown tomentum and black hairs ; third segment almost as short as second. Palpi and proboscis black with yellow hairs. Bristles of upper occiput black, fine, strongly proclinate, with fine black hairs medially ; lower occiput and beard with fine, sparse, white hairs.

Thorax. Black with rather thin, golden brown tomentum. Mesonotum more brown anteriorly, becoming grey posteriorly and on scutellum, but without definite pattern ; a little paler brown near humeri. Bristles mostly white, but occasionally black : 2 notopleural, 1 supra-alar, 1 postalar ; a single pair of dorsocentrals conspicuous in a row of fine dorsocentral hairs, black anteriorly, yellow posteriorly ; a few fine black acrostichals. Scutellum grey,

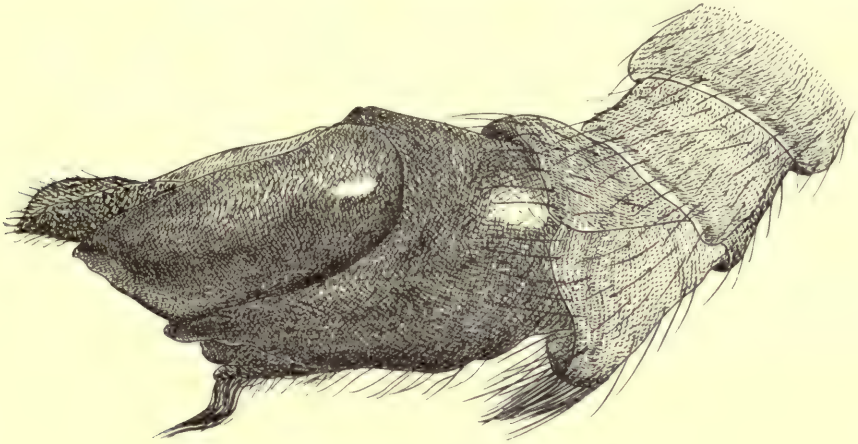
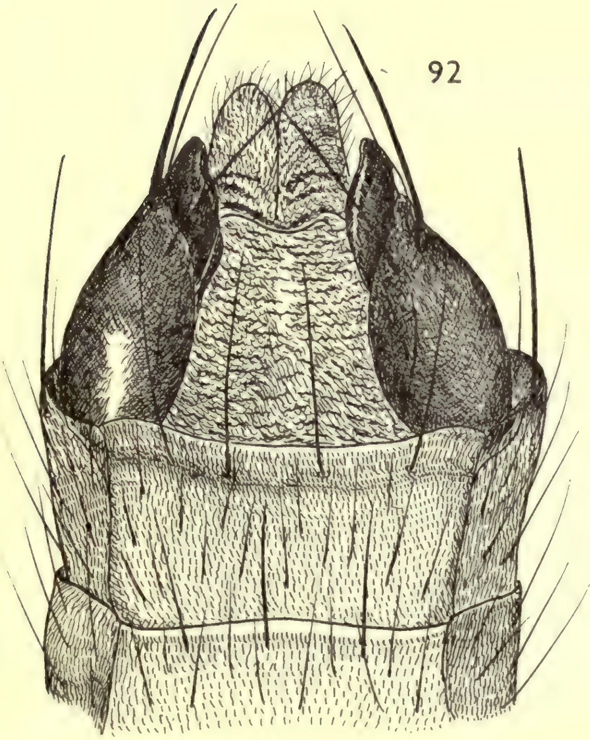
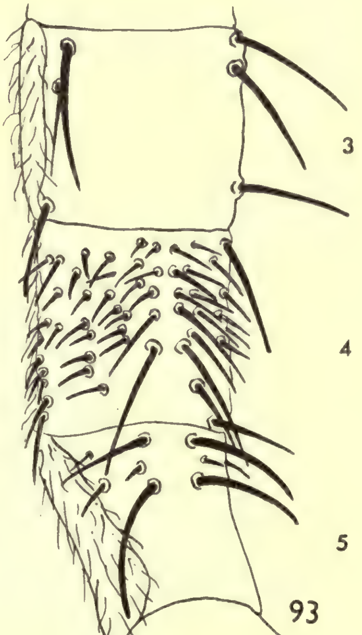


FIG. 91. *Ommatius caligula*, ♂ genitalia.





FIGS 92–93. 92, *Ommatius caligula*, ♀ genitalia ; 93, *Ommatius caligula*, abdominal sternites with bristles (cf. fig. 89).

with fine, yellowish discal hairs, and two long, yellow, marginal bristles. Pleura with thin, golden brown tomentum on dorsal half and whitish tomentum ventrally. Hairs and bristles mostly yellowish ; a distinct pteropleural bristle, and a vertical row posteriorly on mesopleuron, as well as before halteres.

Abdomen dorsally with dense brown tomentum, more greyish anteriorly, more reddish brown posteriorly, with fine yellow hairs becoming more bristly laterally, but without true bristles on tergites. Sternites 4, 5 bare, shining, others covered with tomentum. A remarkable arrangement of strong yellow bristles : a single pair on segment 2 and an arrangement on segments 3, 4, 5 as shown in Text-fig. 93.

Male genitalia very long, shining black, shaped as in Text-fig. 91.

Legs. Coxae like pleura, trochanters black. Femora entirely reddish yellow : fore femora ventrally with a row of about 4 powerful yellow bristles. Tibiae and basitarsi also reddish yellow, tarsi then becoming progressively darker.

Wings. Uniformly greyish, with a coating of microtrichiae. Halteres reddish brown.

Length of body 7 mm ; of wing 6 mm.

♀ closely resembles male, except that ventral bristles on abdomen—evidently a secondary sexual character—are much less strongly developed. Female genitalia as in Text-fig. 92, eighth tergite strongly convex and overlapping sternite, giving this species a distinctive appearance.

Holotype ♂. GARAMBA NATIONAL PARK : P.N.G., 3678, Ndelele /4, 18.vi.1952 (IPNC).

Paratypes. Same data as holotype, 2 ♂, 7 ♀ ; 2680, 2 ♀ ; 3488, PpK/55, 3 ♀, 20.v.1952 (IPNC).

Ommatius canicoxa Speiser

(Text-fig. 94)

Ommatius canicoxa Speiser, 1913 : 142.

GARAMBA NATIONAL PARK : P.N.G., 199 I/a/3, 1 ♀, 7.ii.1950 ; 213, I/a/3, 1 ♀, 20.ii.1950 ; 395, I/o, 1 ♂, 27.ii.1950 ; 528, 529, Akam, 1 ♂, 2 ♀, 19.v.1950 ; 832, I/O/2, 1 ♂, 2 ♀, ix.1950 ; 3476, Aka/2, 1 ♂, 19.v.1952 (IPNC).

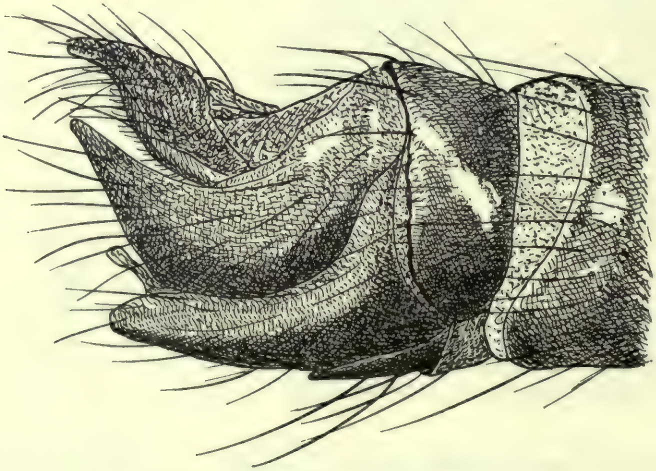


FIG. 94. *Ommatius canicoxa*, ♂ genitalia.

O. canicoxa Speiser was described from the Kamerun, near Duala, and as far as can be decided from the description alone, it is represented in the BMNH by a small series from the Cameroons and Nigeria. The material agrees with Speiser's description in the general colouring, and in particular in the wings, which are brownish antero-apically, and have the costal margin dilated. [die Ausbuchtung des Vorderrandes, welche vielen *Ommatius*-Arten zukommt. . . .]

East African specimens resembling these were recorded by Oldroyd (1939 : 42) and by Lindner (1955 : 44), with a note of interrogation. Although there is considerable individual variation in chromatic characters as well as in size, it seems possible to distinguish two species by the dilation or not of the costal margin in the male, and in both sexes by the extent of the reddish base of the hind femora. Both species occur in the present collection ; those listed immediately above are the specimens believed to be true *canicoxa*, and the others, including Oldroyd's and Lindner's specimens, are referred to a new species, *Ommatius drusus* sp. n.

***Ommatius drusus* sp. n.**

(Text-figs 95, 96)

Ommatius sp. near *canicoxa* Speiser ; Oldroyd, 1939 : 41.
Ommatius aff. *canicoxa* Speiser ; Lindner, 1955 : 44.

Closely similar to *canicoxa* Speiser, and with almost identical male genitalia (Text-figs 94, 95), but distinguished by not having the costal margin of the wing noticeably dilated, and usually by having the hind femora dimidiate, i.e. divided in the middle into a reddish yellow basal half, and a black apical half, with oblique border between the two colours.

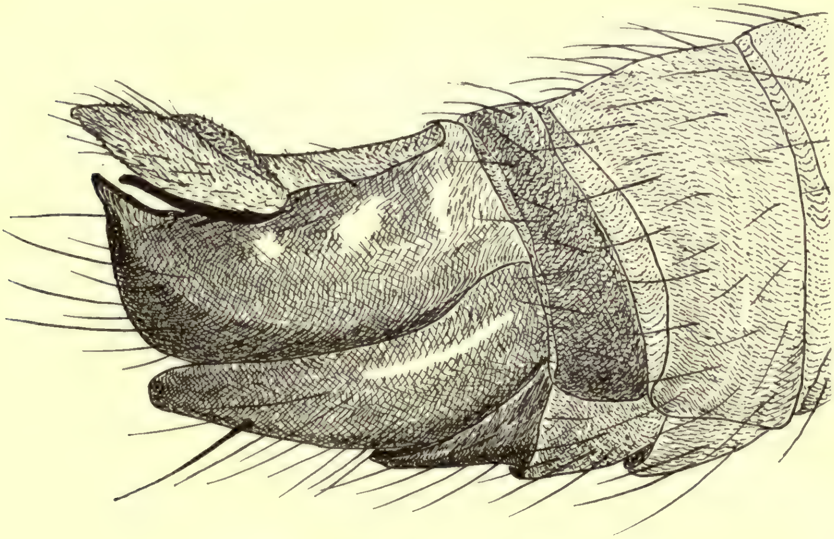


FIG. 95. *Ommatius drusus*, ♂ genitalia.

♂ *Head.* Frons narrower than in *canicoxa*, vertex less deeply excavated ; tomentum of frons light golden brown, ocellar tubercle shining black, prominent, and with two very strong black bristles ; hairs along eye-margins extremely small and inconspicuous ; face high and narrow, tomentum pale yellowish, moustache white on mouth-margin, extended towards antennae as two rows of black bristles. Antennae black, with black bristles ; third segment short. Proboscis and palpi black with yellow hairs. Upper occipital bristles black, proclinate ; lower occipital bristles and scanty beard whitish.

Thorax. Mesonotum rust-brown, more yellowish on shoulders and posteriorly, but without definite pattern. Strong black bristles : 2 notopleurals, 1 supra-alar, 1 postalar, 3 pairs of weak dorsocentrals. Scutellum with brassy yellow tomentum, weak and indistinct pale discal hairs, and one pair of black marginal bristles. Pronotum brownish medially, laterally pale yellowish like pleura ; pronotal collar of weak black bristles ; pleura with fine, pale, yellow hairs and stout black bristles, including a pteropleural bristle.

Abdomen. Dorsally cinereous, with dull reddish posterior margins to segments. Clothing hairs black, longer on hind margins, replaced laterally by yellowish hairs and one or more long marginals. Venter similar, with fine, yellow hairs. Male genitalia as in Text-fig. 95, black, but sometimes reddish.

Legs. Coxae somewhat yellowish in ground colour, with yellow hairs and bristles. Trochanters reddish. Femora reddish yellow with black markings : fore and middle femora black anterodorsally ; hind femora black apico-dorsally, with an oblique line of division between black and reddish areas (extent of colour varies, as well as distinctness of division between the two areas). Fore and middle tibiae and basitarsi reddish, with black tips ; a dorsal black stripe on tibiae and segments 2–5 of tarsi black. Hind tibiae reddish on basal half, blackish apically, tarsi blackish.

Wings. Costal margin not appreciably dilated ; sometimes only dark brown over a small stigmal area, otherwise mostly pale greyish as a result of microtrichiae which cover all cells except second basal. Halteres with yellowish stalk and deep red knob.

Length of body 10 mm ; of wing 9 mm.

♀ Similar to male ; ♀ genitalia Text-fig. 96.

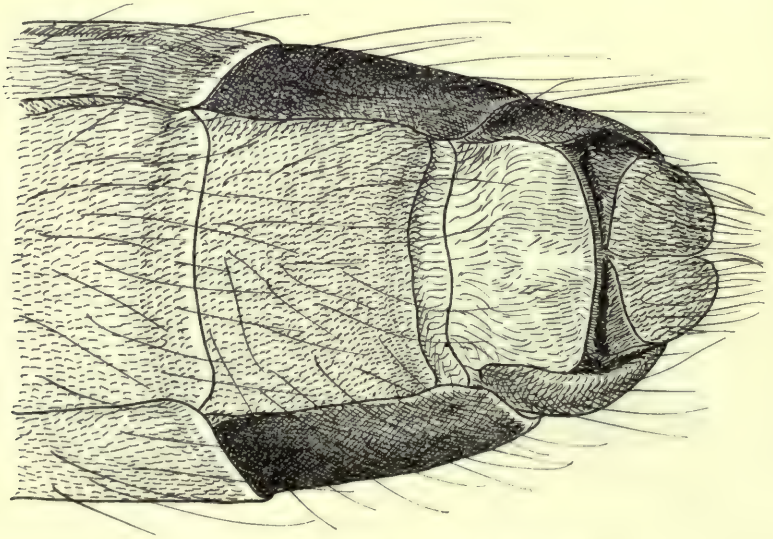


FIG. 96. *Ommatius drusus*, ♀ genitalia.

Holotype ♂. UGANDA : Namwamba Valley, 6500 ft (*F. W. Edwards*) (BMNH).

Paratypes. Same data as holotype, 3 ♀ ; UGANDA : Budongo Forest, 1 ♀ ; Kilembe, 4500 ft, 4 ♂, 4 ♀ ; Mobuka Valley, c. 4000 ft, 1 ♂, 2 ♀ ; Mbarara, 1 ♀ (all coll. *F. W. Edwards*) Kyarumba, 4500′ (*D. R. Buxton*), 3 ♀ ; Nyamgasani Valley, 6400′ (*D. R. Buxton*), 1 ♀ (BMNH).

GARAMBA NATIONAL PARK : P.N.G., 456, I/b/1, 1 ♂, 12.iv.1950 (*G. Demoulin*) ; 527, I/)/1, 1 ♂, 1 ♀, 17.v.1950 ; 3197, Anie/9, 1 ♀, 18.iii.1952 ; 3229, BESK, 8/d/9, 1 ♀, 25.iii.1952 ; PpK, 73/d/9, 1 ♀, 8.iv.52 ; 3463, Aka, 1 ♀, 15.v.1952 ; 3476, Aka/2, 1 ♂, 19.v.1952 ; II/fd/17, 1 ♂, 27.viii.52 (IPNC).

Ommatius ?longipennis Lindner

Ommatius longipennis Lindner, 1955 : 45.

GARAMBA NATIONAL PARK : P.N.G., 3480, Inimvua, 1 ♂, 16.v.1952 ; 3844, Mt. Moyo, 1 ♀, 29.vii.52 (IPNC).

UELE : Aba, 1 ♂, 20.iv.1914 (*Dr. Rodhain*) (MRAC).

This species is very variable in the colour of the hind femora. It is provisionally identified with *longipennis* Lindner, though no information is given in Dr. Lindner's description about the genitalia. Confirmation of this identification must await a fuller study of the genus *Ommatius* in Africa.

Ommatius imperator Oldroyd

Ommatius imperator Oldroyd, 1939 : 45.

UELE : Bambesa, 1 ♂, 1 ♀, 10.x.1933 (*J. Leroy*) (MRAC).

This species was described by me many years ago from specimens collected in Uganda by Neave and by T. H. E. Jackson. As far as I am aware, this is the first time that any other specimens have been noted, and so I record them in this paper.

O. imperator is perhaps the most striking species of the genus *Ommatius*, having the black body and yellow, black-tipped wings that are common to a whole complex of aposematic insects of various Orders.

ACKNOWLEDGEMENTS

I am deeply indebted to the late Dr. V. van Straelen for inviting me to study this most interesting material, and for originally agreeing to publish it, with the addition of other relevant material from the Congo Basin ; to Dr. P. Basilewsky for courteously allowing me to incorporate large collections of specimens from the collection of the Musée Royale de l'Afrique centrale, and to Monsieur F. J. François and the authorities of the Institut R. des Sciences naturelles de Belgique for similar courtesies in respect of material collected in Urundi by Monsieur François.

I am also indebted to Mr. Philip Blasdale for determining the specimens of *Philodicus* and *Promachus* and to Dr. L. Tsacas for advice about specimens of *Neomochtherus*, which he will incorporate into his own studies of that genus.

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Printed in England by Staples Printers Limited at their Kettering, Northants, establishment

A LIST OF THE TYPE-SPECIMENS OF PLECOPTERA AND MEGALOPTERA IN THE BRITISH MUSEUM (NATURAL HISTORY)

BRITISH MUSEUM
4 MAY 1970
NATURAL HISTORY

D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 8
LONDON : 1970

A LIST OF THE TYPE-SPECIMENS OF PLECOPTERA AND MEGALOPTERA IN THE BRITISH MUSEUM (NATURAL HISTORY)

BRIT. SCI. MUSEUM
4 MAY 1970
NATURAL HISTORY

BY

DOUGLAS ERIC KIMMINS

Pp. 335–361

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 8
LONDON : 1970

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By D. E. KIMMINS

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SYNOPSIS

In these lists, 171 taxa of Plecoptera and 74 taxa of Megaloptera are considered. Lectotypes are designated for 43 taxa of Plecoptera and 21 taxa of Megaloptera. The types of 8 other taxa of Plecoptera are either unlabelled and not recognizable from the descriptions, or have not been traced, being possibly in other collections.

INTRODUCTION

THIS list follows the general pattern of my previous Odonata Type Lists, but as the Plecoptera and Megaloptera are relatively small orders, I have not considered it necessary to present separate lists for the various families, all the taxa being dealt with alphabetically under the respective orders, and a combined list of references is given.

NOTES

1. The recognition of the individual types of the Plecoptera and Megaloptera described by Stephens presents some difficulties, since at some time since its presentation to the BMNH, the Stephens Collection was re-arranged by what McLachlan has described as a 'non-expert'. The specimens in most cases bore only a Stephens Collection label and were arranged over a small handwritten determination label. In few cases was there any indication of locality. During this re-arrangement, the various synonyms were placed together and the determination label placed on one of the series, with the result that it is almost impossible to differentiate the various type-series. In labelling types, the example bearing a determination label has been accepted as type, unless there is definite evidence to the contrary.

2. In the case of some of the Leptoperlid types from Australia, reference is made to the wings being mounted in de Faure's medium, a water-soluble mountant. This was recommended to me by the late Dr F. W. Edwards in the early 1940's. It works quite well for wings and other very thin objects, particularly if the mounts are ringed with varnish. I found it however quite unsuitable for use with thicker mounts, such as whole Leptoperlids. Shrinkage of the medium in drying caused

air to be drawn in and these preparations had eventually to be dissolved in warm water, dehydrated and cleared and remounted in canada balsam.

3. The Walker Type label is circular, bearing the word 'Type' and ringed with a green line. McLachlan's type label is small, rectangular, pink, red or purplish, bearing the word 'Type'.

PLECOPTERA

abdominalis Stephens (***Leuctra***), 1836 : 145; Mosely, 1932 : 33, pl. 2, fig. 7a. LECTOTYPE ♀. Stephens Coll. / abdominalis / klapáleki ♀ (not albida), det. K. G. Blair / Leuctra fusciventris Steph. (klapáleki Kny) M. E. Mosely det. / Leuctra abdominalis Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

The ♀ type is in fragments. Mosely (1932 : 33) restricted the type-series to the ♀ with abdomen mounted in canada balsam, and figured on pl. 2, fig. 7a. Currently placed as a synonym of *L. fusciventris* Stephens.

abnormis Newman (***Perla***), 1838 : 177–178. Holotype ♀. Abnormis Newman, Ent. Mag. V.177, Trenton Falls, N. A. (*R. Foster*) / Perla abnormis Newm., ♀ Holotype.

Newman's label is much blackened and has been transcribed. Currently placed in *Acroneuria*.

acicularis Despax (***Chloroperla***), 1934 : 367–370, pls 1, fig. 4; 4, fig. 15; 11, fig. 30; text-figs 22–24. Holotype ♂ (in 2% formaldehyde solution and on two microscope preparations). [France, Cantal], Le Lioran, 9–19.vii.[19]24 (*M. E. Mosely*), Chl. acicularis Despax, ♂ Type.

Currently placed in *Isoperla*.

aethiops Walker (***Perla***), 1852 : 154. Holotype ♀. Walker type-label / Mexico / 45. PERLA ÆTHIOPS [printed label from Walker's catalogue] / Anacroneuria [C. G. Froelich, 1968].

Currently placed in *Anacroneuria*.

affinis Stephens (***Nemoura***), 1836 : 141. LECTOTYPE [sex unknown]. Stephens Coll. / Nemoura affinis Steph., Lectotype, D. E. Kimmins det. 1969.

The lectotype lacks its abdomen, sex unknown. Currently placed as a synonym of *Nemoura cinerea* (Retzius).

albidipennis Walker (***Nemoura***), 1852 : 191; Ricker, 1938 : 133, fig. 8. Holotype ♀. Walker type-label / R [on green paper] / Nova Scotia (*Redman*) / Nemoura albidipennis Walk., ♀ Holotype, D. E. Kimmins det. 1959.

Hind wings mounted dry between celluloid, metathorax and abdomen cleared and mounted in canada balsam. Currently placed in *Nemoura* (*Ostrocerca*).

albomacula Kimmins (***Udamocercia***), 1951 : 90–91, figs 39, 40a–c. Holotype ♂. Tas[mania], Cradle Mt, 16.i.[19]17 (*R. J. Tillyard*). / Udamocercia albomacula Kimm., ♂ Type.

One pair of wings mounted dry, genitalia in canada balsam, attached to specimen pin. Currently placed in *Kimminsoperla*.

anglica Aubert (ssp. ***Capnia vidua***), 1950 : 315–316, fig. 35. Holotype ♂ (in 2% formaldehyde solution). [England], Cheshire, Woodhead, 1.iv.1933 (*H. Britten*) / Capnia anglica Aub., ♂ Holotype, ♀ allotype, designated by D. E. Kimmins (i.l.), 1950.

anglica Kimmins (***Rhabdiopteryx***), 1943 : 42–44, 8 text-figs. Holotype ♂. [England], Yorks[hire], Pickering Beck, 28.iii.1942 (*H. Whitehead*) / Rhabdiopteryx anglica Kim., ♂ Holotype.

bifasciata Kimmins (***Udamocercia***), 1951 : 91–92, figs 40d–f. Holotype ♂. Tasmania (*J. W. Evans*) / Udamocercia bifasciata Kim., ♂ Type.

Mounted as two preparations, in canada balsam. Currently placed in the genus *Kimminsoperla*.

biloba Newman (***Pteronarcys***), 1898 : 176. Holotype ♀. Pteronarcys Newman. Biloba Newman, Ent. Mag. V. 176, Trenton Falls, N.A. (*R. Foster*).

The label is blackened but still legible. Currently placed as *Pteronarcys* (*Allonarcys*).

bituberculata Kimmins (***Nemoura***), 1950*a* : 208–209, fig. 17. Holotype ♀. Assam, Delai valley, Taphlogam, 4000 ft, 11.xi.1936 (*M. Steele*) / Nemoura bituberculata Kimm. ♂ H.T. Type.

Mounted as two preparations, in canada balsam.

brevipennis Kimmins (***Dinotoperla***), 1951 : 67–68, figs 18a–e. Holotype ♂. [Australia], New South Wales, Bolaro, 22.xii.1935 (*R. J. Tillyard*) / Dinotoperla brevipennis Kim., ♂ TYPE.

Mounted as two preparations, wings in de Faure's medium, remainder in canada balsam.

bullata Kimmins (***Spaniocerca***), 1951 : 88–90, figs 38a–e. Holotype ♂. Tasmania (*J. W. Evans*) / Spaniocerca bullata Kimmins, ♂ TYPE.

Mounted as two preparations in canada balsam.

californicus Newport (***Pteronarcys***), 1848 : 388; 1851 : 450. Holotype ♂. California (*Hartweg*) / Pteronarcys californica Newport, Proc. Linn. Soc. 1848 / Pteronarcys californicus Newp., ♂ Holotype, D. E. Kimmins det. 1969.

The first description of this species is in *Proc. Linn. Soc. Lond.* for 20.vi.1848, and it should be noted that the actual date of publication of p. 388 was 1848, but p. 389 was not published until 1849. The paper subsequently appeared in the *Trans. Linn. Soc. Lond.* **20** (3) : 444–452, in 1851.

[***cambrica*** Stephens (***Nemoura***), 1836 : 143. I have been unable to recognize the type-specimen of *cambrica* in the Stephens Collection, the three possible examples (females) being smaller than the dimensions given by Stephens.]

[***carpenteri*** Tillyard (***Dinotoperla***), 1921*b* : 270–274, 4 text-figs.

The type of this species did not come to the BMNH with the Tillyard Bequest. It may still be in the Cawthron Institute, Nelson, N.Z.]

chrysostoma Klapálek (***Brahmana***), 1916 : 63. LECTOTYPE ♀. Mungphu (*Atkinson*) / chrysostoma, Klapálek / Brahmana chrysostoma Klap., ♀ Lectotype, D. E. Kimmins det. 1969.

citronella Newport (***Perla***), 1848 : 388; Walker, 1851 : 169–170 (as *citrinella*); Ricker, 1948 : 144–145, figs 28–30 (♀ lectotype designated). Lectotype ♀. [Canada], Hudson's Bay, [Albany River, St. Martin's Falls] / 269 or 668, Perla citronella / Perla citronella Newp., ♂ Lectotype, design. W. E. Ricker, 1938.

Currently placed in *Isoperla*. For note on date of publication, see *californicus* (*Pteronarcys*), p. 00.

clio Newman (***Isogenus***), 1839 : 415. LECTOTYPE ♂. Georgia / Perla Clio / Isogenus clio Newm., ♂ Lectotype, D. E. Kimmins det. 1969.

The lectotype has the abdomen cleared and mounted in canada balsam. There is one ♂ paralectotype.

clymene Newman (***Chloroperla***), 1839 : 87. Holotype ♀. Georgia / Clymene Newm. / clymene, Klapálek.

Currently placed in *Neoperla*.

compacta McLachlan (***Dictyopteryx***), 1872 : 53–54, pl. 1, figs 6, 7–7b. LECTOTYPE ♂. Type [McL. label] / Sibir. Or. (*Maack*) / compacta McL. / Dictyopteryx compacta McL., ♂ Lectotype, D. E. Kimmins det. 1969.

The BMNH also possesses the ♀ paralectotype of this species. Currently placed in the genus *Arcynopteryx*.

completa Walker (***Nemoura***), 1881 : 191–192; Ricker, 1938 : 133. Holotype ♂. Walker type-label / R [on green paper] / N[ova] Scotia (*Redman*) / 52. NEMOURA COMPLETA [label cut from Walker's catalogue] / Nemoura. W. R[icker].

The abdomen of the type has been cleared and mounted in canada balsam. Currently placed in *Nemoura* (*Prostoia*), of which it is the type-species.

concolor Banks (***Peltoperla***), 1931*a* : 411–412. LECTOTYPE ♂. B[ritish] N[orth] Borneo, Mt Kinabalu, Kamborangah, 7000 ft, 27.iii.1929 (*H. M. Pendlebury*) [*ex* F.M.S. Museum] / Peltoperla concolor Bks, *type* / Peltoperla concolor Bks, ♂ Lectotype, D. E. Kimmins det. 1969.

cordata Kimmins (***Capnia***), 1947 : 733–734, figs 9, A–D. Holotype ♂. Tibet, Gyantse, 13000 ft, 28.vi.1928 (*F. M. Bailey*) / Capnia cordata Kimm., ♂ Type, 1946, D. E. Kimmins det.

Type pinned (in poor condition), abdomen cleared and mounted in canada balsam.

cruciata Stephens (***Nemoura***), 1836 : 141. LECTOTYPE ♀. Stephens Coll. / cruciata / Nemoura cruciata Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Nemoura cinerea* (Retzius).

corsicana Morton (***Nemura*** (***Protonemura***)), 1930 : 80–81, pl. 2, figs 3–5. LECTOTYPE ♂. Corsica, Corte, 21.v.–8.vi.1928 (*M. E. Mosely*) / Nemoura corsicana Morton, ♂ Lectotype, D. E. Kimmins det. 1969.

Morton did not specify a type nor its location, but Mosely had labelled the preparations, from which Morton's genitalia figures were drawn, as Type. To validate his action, I have designated these preparations as Lectotype. Currently placed in the genus *Protonemura*.

cydippe Newman (***Chloroperla***), 1839 : 88. Lectotype ♀ (Ricker, 1938 : 148, fig. 38). Georgia, 18a / 88. PERLA CYDIPPE (label cut from Walker's catalogue) / Chloroperla cydippe Newman, ♀ Lectotype, W. E. Ricker, 1938.

One pair of wings mounted dry, abdomen in canada balsam. Currently placed in *Hastaperla*.

[***cymodoce*** Newman (***Perla***), 1839 : 37. No types of this species found in BMNH.]

cyrene Newman (***Chloroperla***), 1845 : 853; Kimmins, 1938 : 564–566, figs 3–4. Holotype ♂. Saunders [Collection] / Chloroperla Cyrene, New Zealand.

One pair of wings mounted dry, abdomen in canada balsam. Currently placed in *Austroperla*.

decisa Walker (***Perla*** (***Chloroperla***)), 1852 : 170. Holotype ♂. Walker type-label / Hudson's Bay, [Albany River, St Martin's Falls] / Perla (Chloroperla) decisa Walker, ♂ Holotype, D. E. Kimmins det. 1969.

The holotype has one pair of wings mounted dry between celluloid and the abdomen cleared and mounted in canada balsam. Currently placed in *Isogenus* (*Cultus*).

decolorata Walker (***Perla*** (***Chloroperla***)), 1852 : 170; Ricker, 1938 : 145–146, fig. 31. LECTOTYPE ♀. Walker type-label / N[orth] Amer[ica], Gt Bear L[ake] / 98. PERLA DECOLORATA [label cut from Walker catalogue] / Perla decolorata Walker, ♀ Lectotype, D. E. Kimmins det. 1969.

Abdomen of lectotype cleared and mounted in canada balsam, for study by Ricker. Currently placed in *Isoperla*. There is also one incomplete paralectotype.

despaxi Mosely (***Leuctra***), 1930 : 249–250, figs 27–28. Holotype ♂. France, Pyrénées Oriéntales, R. Tet, Mont Louis, 22.vi–2.vii.1923 (*M. E. Mosely*) / Leuctra despaxi Mosely ♂ Type.

The holotype is a whole insect, cleared and mounted as a microscope preparation in euparal.

dichroa McLachlan (***Dictyopteryx***), 1872 : 52–53, pl. 1, figs 4–4a, 5–5b. LECTOTYPE ♂. Type [McL. label] / Sibir. orient. (*Maa*[*c*]*k*) / dichroa McL. / Dictyopteryx dichroa McL., ♂ Lectotype, D. E. Kimmins det. 1969.

The type-series in BMNH includes 1 ♂ and 1 ♀ paralectotypes. Currently placed in the genus *Arcynopteryx*.

diminuta Kimmins ***(Megaleptoperla)***, 1938 : 568–570, figs 6, 7. Holotype ♂. New Zealand, Ohakune, 1922–1923 (*T. R. Harris*) / Megaleptoperla diminuta Kimmins, ♂ Type, det. D. E. Kimmins.

The abdomen of the type has been cleared and mounted in canada balsam. Fig. 2 shows the ♀ wings, not those of the ♂; the anterior branch of 3A is erroneously shown as forked.

[***diversipes*** Tillyard (***Tasmanoperla***), 1931 : 41.

The type of this species did not come to the BMNH with the Tillyard Bequest collection.]

divisa Klapálek (var. of ***Togoperla perpicta*** Klapálek), 1921 : 64. LECTOTYPE ♂. N. China [Shanghai, Fortune Coll.] / infuscata Klapálek / var. divisa / Togoperla perpicta var. divisa Klap., ♂ Lectotype, D. E. Kimmins det. 1969.

This specimen has been labelled 'Type' for many years. The second syntype, from China, is Walker's spec. 'b' of *infuscata* and is a ♂, not a ♀ as stated by Klapálek.

dorsalis Kimmins (***Kyphopteryx***), 1947 : 725–727, figs 1B, 3A–G. Holotype ♂. Tibet, Chumbi Valley, 11000 ft, 2.iv.1924 (*R. W. G. Hingston*), Everest Exped. / Kyphopteryx dorsalis Kim., ♂ Type.

One pair of wings mounted dry, the other pair and the remainder of the type in canada balsam (3 slides).

drymo Newman (***Isogenus***), 1839 : 86. LECTOTYPE ♀. Georgia / Perla drymo [with addition 'OK WR'] / Isogenus drymo Newman, ♀ Lectotype, D. E. Kimmins det. 1969.

There is also a ♀ paralectotype. Currently placed in *Perlinella*.

ephyre Newman (***Chloroperla***), 1839 : 87–88. Holotype ♀. Georgia / 17. *Ephyre* Newman, Georgia, 17 / Having only 2 ocelli this species belongs (according to Klapálek) to genus Atoperla, C.J.G.

eulegnica Tillyard (ssp. of ***Eusthenia spectabilis***), 1921*a* : 230, pl. 13, fig. 4. Holotype ♀. Tasmania, Tyenna, 29.xii.[19]16 (*C. E. Cole*) / Eusthenia spectabilis eulegnica n. subsp., ♀ Holotype, R.J.T.

evansi Kimmins (***Dinotoperla***), 1951 : 70–71, figs 20a–c, 21a. Holotype ♂. S. Australia, Mt Lofty, x.1931 (*J. W. Evans*) / Dinotoperla evansi Kim., ♂ TYPE.

Mounted as three preparations, wings dry, remainder in canada balsam.

exigua Kimmins (***Leptoperla***), 1951 : 53–54, figs 6a–d. Holotype ♂. W[est] Australia, Kelmscott, 22.xi.[19]32 (*R. J. Tillyard*) / Leptoperla exigua Kim., ♂ TYPE.

Mounted as two preparations, wings in de Faure's medium, remainder in canada balsam.

exilis McLachlan (***Perla***), 1872 : 54–55, pl. 1, figs 8, 8a. Holotype ♀. Type [McL. label] / Sibir. orient. (*Maa*[*c*]*k*) / exilis McL. / Perla exilis McL., ♂ Holotype, D. E. Kimmins det. 1969.

Illies (1966, *Tierreich*, 32 : 501) treats this as a *nomen oblitum*.

extensa Tillyard (ssp. ***Eusthenia purpurescens***), 1921*a* : 230. Holotype ♀. Tasmania, Russell, 26.xii.1916 (*C. E. Cole*) / Eusthenia purpurescens extensa n. subsp., ♀ Holotype, R.J.T.

falcula Kimmins (***Protonemura***), 1950*a* : 196–198, figs 1–3. Holotype ♂. Assam, Mishmi Hills, Chhaglon, 5350 ft, 26.ii.1935 (*M. Steele*) / Protonemura falcata Kim., ♂ TYPE.

Mounted as two preparations in canada balsam.

fascipennis Banks (***Javanita***), 1931 : 378. LECTOTYPE ♂. Peninsular Siam, Nakon Sri Tamarat, Khao Ram, 750 ft, 24.ii.1922 (*H. M. Pendlebury*) / Ex F.M.S. Museums / Javanita fascipennis Bks type / Javanita fascipennis Bks, ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed as *Neoperla*.

fasciata Tillyard (***Dinotoperla***), 1924 : 193. Holotype ♀. Q[ueensland], National Park, 1500–2000 ft, 20.ii.[19]21 [*A. J. Turner*] / Dinotoperla fasciata Till., Holotype ♀, R.J.T.

One pair of wings mounted dry, in celluloid.

ferruginea Walker (***Nemoura*** (***Leuctra***)), 1851 : 183; Ricker, 1938 : 134, fig. (Lectotype ♀ designated). Lectotype ♀. Walker type-label / R on green label [*Redman*] / Nova Scotia

(*Redman*) / 18. NEMOURA FERRUGINEA [label cut from Walker catalogue] / Nemoura ferruginea Walker, ♀ Lectotype, design. W. E. Ricker, 1938.

Currently placed in the genus *Leuctra*. Ricker's designation of lectotype appears a little vague, but as he states that the lectotype was used as the basis of the figure, and only one example was cleared for drawing, that specimen only can be the lectotype. There are two paralectotypes.

filigera Kimmins (***Amphinemura***), 1947 : 730–731, figs 6A–C. Holotype ♂. [India], Bengal, Darjeeling distr., xi.1945 (*D. E. Kimmins*) / Amphinemura filigera Kim., ♂ Type.

Type with wings mounted dry, remainder in canada balsam.

flavescens Kimmins (***Nesoperla***), 1938 : 570–571, figs 8A–C. Holotype ♀. New Zealand, [S. Island], L. Wakatipu, ii.1911 (*G. V. Hudson*) / Nesoperla flavescens Kimm., ♀ Type, det. D. E. Kimmins.

One pair of wings mounted dry, apex of abdomen in canada balsam.

flavomaculata Mosely (***Leuctra***), 1935 : 560–561, figs 4–5. Holotype ♂. France, Puy-de-Dôme, Le Mont-Dore, 24.vi–6.viii.1934 (*M. E. Mosely*) / Leuctra flavomaculata Mosely, ♂ Type.

The ♂ type was taken coupled, and the two specimens have been cleared and mounted as a preparation in euparal. Mosely specified the ♂ as Type, the ♀ as paratype.

flavotincta McLachlan (***Perla***), 1872 : 54, pl. 1, figs 9–9a. Holotype ♀. Type [McL. label] / Sibir. Or. (*Maack*) / flavotincta McL. / Perla flavotincta McL., ♂ Holotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Paragnetina*.

fontana Kimmins (***Dinotoperla***), 1951 : 64–66, figs 16a–e. Holotype ♂. Australia / F[ederal] C[apital] T[erritory], Lee's Springs, xi.1932 (*R. J. Tillyard*) / Dinotoperla fontana Kim., ♂ TYPE.

Mounted as three preparations, wings in de Faure's medium, remainder in canada balsam.

foveolata Klapálek (***Neoperla***), 1921 : 321. LECTOTYPE ♂. Hong Kong / foveolata Klapálek / triangle of black paper / Neoperla foveolata Klap., ♂ Lectotype, D. E. Kimmins det. 1969.

There are also 1 ♂, 1 ♀ paralectotypes from N. China.

fraterna Banks (***Nogiperla***), 1938 : 223, figs 7, 14. Holotype ♀. F[ederated] M[alay] S[tates], Pahang, Cameron's Highlands, 4800–5500 ft, 8.vi.1935 (*H. M. Pendlebury*) / E. F.M.S. Museums / Nogiperla fraterna Banks, Type.

fraterna Morton (***Leuctra***), 1930 : 79, pl. 2, figs 6–7; Mosely, 1932 : 20. LECTOTYPE ♂. Corsica, Corte, 21.v.–8.vi.1928 (*M. E. Mosely*) / Leuctra fraterna Morton [M.E.M. label] / Leuctra fraterna Morton, ♂ Lectotype, D. E. Kimmins det. 1969.

Mosely (1932) stated that the type was a preparation in his collection and he placed a BM type-label on it. This has now been replaced by my Lectotype label.

frontalis Newman (***Isogenus***), 1838 : 178. LECTOTYPE ♀ [incomplete]. Isogenus Newman. Frontalis Newman, Ent. Mag. V, 178, Trenton Falls, N. A. (*R. Foster*) / Isogenus frontalis Newman, ♀ Lectotype, D. E. Kimmins det. 1969.

Currently placed as *Isogenus* (*Isogenoides*). There is one ♀ paralectotype, labelled R. Foster, New York.

fuliginosa Stephens (***Nemoura***), 1836 : 141. LECTOTYPE ♀. Stephens Coll. / fuliginosa / Nemoura fuliginosa Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Nemoura cinerea* (Retzius).

fumosa Stephens (***Nemoura***), 1836 : 143. LECTOTYPE [?sex]. Stephens Coll. / fumosus / Nemoura fumosa Steph., Lectotype, D. E. Kimmins det. 1969.

Morton (1894 : 571) states that this is *Nemoura cinerea* Olivier [= *Amphinemura sulcicollis* (Stephens)]. The type now lacks its abdomen.

fusca Kimmins (***Dinotoperla***), 1951 : 71–72, figs 21 b, c. Holotype ♀. Tasmania (*J. W. Evans*) / Dinotoperla fusca Kim., ♀ TYPE.

Mounted as two preparations in canada balsam.

[***fuscipennis*** Stephens (***Chloroperla***), 1836 : 138. Type unlabelled and not recognizable from Stephens' description.]

fusciventris Stephens (***Leuctra***), 1836 : 145; Mosely, 1932 : 32–33, text-figs 50–51, pl. 2, fig. 7. Lectotype ♂. Stephens Coll. / fusciventris / Leuctra fusciventris Steph., ♂ Lectotype, D. E. Kimmins det. 1969.

Mosely (1932 : 33) restricted the type-series to the ♂, of which the abdomen had been cleared, mounted in canada balsam and figured on pl. 2, and in effect designated this specimen as a lectotype.

geniculata Stephens (***Leuctra***), 1836 : 145. LECTOTYPE ♀. Stephens Coll. / geniculata / Leuctra geniculata Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

One other ♀ example remains in the Stephens Coll., and has been labelled as a paralectotype.

glacialis Newport (***Nemoura*** (***Brachyptera***)), 1849 : 389; 1851 : 451; Walker, 1851 : 192; Ricker, 1938 : 131, 132, figs 1–7 (lectotype designation). Lectotype ♂. Hudson's Bay, [Albany River, St Martins Falls] / Nemoura glacialis Newport Holotype (= Taeniopteryx, s. l.) W. E. Ricker.

The lectotype has one pair of wings mounted dry and the abdomen in canada balsam. For notes on date of publication, see *Pteronarcys californicus* Newport.

hamulata Morton (***Isopteryx***), 1930 : 78–79, pl. 2, figs 8–9. LECTOTYPE ♂. Corsica, Corte, 21.v–8.vi.1928 (*M. E. Mosely*) / Isopteryx hamulata Morton, ♂ Type [M.E.M. label] / Isopteryx hamulata Morton, ♂ Lectotype, D. E. Kimmins det. 1969.

Type mounted as two preparations, one in canada balsam, one pair of wings mounted dry. I consider this to be a synonym of *Chloroperla apicalis* (Newman). Currently placed in the genus *Chloroperla*.

hingstoni Kimmins (***Capnia***), 1947 : 732–733, figs 8A–F. Holotype ♂. Sikkim, Gnatang, 12000 ft, 31.iii.1924 (*R. W. G. Hingston*) Everest Exped. Capnia hingstoni Kim., ♂ Type.

Type on microscope slides, wings dry, remainder in canada balsam.

hudsoni Kimmins (***Spaniocercoides***), 1938 : 577–579, figs 13–15. Holotype ♂. New Zealand (*G. V. Hudson*) / Korokoro, 12.x.1923 / Spaniocercoides hudsoni Kimmins, ♂ Type, det. D. E. Kimmins.

indica Kimmins (***Protonemura*** ?) 1947 : 727–728, figs 4A–C. Holotype ♂. [India], Bengal, Darjeeling district, xi.1945 (*D. E. Kimmins*).

Type preserved in 2% formaldehyde solution.

insularis Morton (***Chloroperla***), 1930 : 77–78, pl. 2, figs 1–2. LECTOTYPE ♂. Corsica, Corte, 21.v–8.vi.1928 (*M. E. Mosely*) / Chloroperla insularis Morton ♂ Type / Chloroperla insularis Morton, ♂ Lectotype, D. E. Kimmins det. 1969 (see note to *Nemura corsicana*, p. 340).

Lectotype mounted as preparations in canada balsam, one pair of wings mounted dry. Currently placed in the genus *Isoperla*.

internata Walker (***Perla***), 1852 : 152–153; Ricker, 1938 : 139, figs 14, 15. Holotype ♀. Walker type label / North America? / Ent[omological] Club, [18]44–12 / 41. PERLA INTERNATA [label cut from Walker's Catalogue]. /

The type is now much faded. Currently placed in *Acroneuria*.

intermixta Walker (***Perla***), 1852 : 153. Holotype ♀. Walker type label / Venezuela / 42. PERLA INTERMIXTA [label cut from Walker's Catalogue] / Anacroneuria intermixta (W.) ♀ [label by C. G. Froehlich, vii.1968].

Illies, 1968 : 503 places this species as a *nomen oblitum*.

irrorata Tillyard (***Trinotoperla***), 1924 : 194, fig. 1. Holotype ♀. N[ew] S[outh] W[ales], [Mt] Kosciusko, [5000–5500 ft], 24.xi.1921 (*R. J. Tillyard*) / Trinotoperla irrorata Till., Holotype ♀, R.J.T.

Holotype body much damaged by insect pests when received in Tillyard Bequest, one pair of wings mounted dry between celluloid, ♂ allotype also with body much damaged by pests.

kempnyi Mosely (***Leuctra***), 1932 : 14, pl. 3, figs 14, 14a; text-figs 13–14. Holotype ♂. France, B[asses] Pyrénées, Eaux-Bonnes, 4–21.vii.1924 (*M. E. Mosely*) / Leuctra kempnyi Mosely ♂ ♀. Taken coupled. Type ♂.

Of the pair, mounted as microscope preparation in euparal, Mosely specifies the ♂ as type, the ♀ as paratype.

[***lacrimosa*** Klapálek (***Paragnetina***), 1921 : 62. Type not traced in BMNH.]

lacustris Tillyard (***Eusthenia***), 1921*a* : 231–232, pl. 12, fig. 5. Holotype ♀. Tas[mania], Cradle Mt., [Lake Lilla], 12.i.[19]17 (*R. J. Tillyard*) / Eusthenia lacustris n. sp., ♀ Holotype, R.J.T.

Allotype ♂ and 1 incomplete ♀ paratype also in BMNH.

larvata Klapálek (***Tetropina***), 1909 : 223 (in key). LECTOTYPE ♂. N.W. Borneo, Baram / larvata, Klapálek / Tetropina larvata Klap., ♂ Lectotype, D. E. Kimmins det. 1969.

I have selected the BMNH example as lectotype, as it is the example which is figured.

lateralis Stephens (***Chloroperla***), 1836 : 138. LECTOTYPE ♂. Stephens Coll. / Chloroperla lateralis Steph., ♂ Lectotype, D. E. Kimmins det. 1969.

Abdomen mounted in canada balsam. Currently placed as a synonym of *Isoperla grammatica* (Scopoli).

lepida Klapálek (***Anacroneuria***), 1922 : 91. Holotype (?sex). Cent[ral] Brazil, Chapada, 2600 ft, xi.1902 (*A. Robert*) / lepida, Klapálek / Anacroneuria lepida Klap., Holotype.

Most of abdomen missing.

lugubris McLachlan (***Perla***), 1875 : 172–173. Holotype ♂, Japan, [Kobé (*Lewis*)] / Perla lugubris, McL. (Type).

Currently placed in the genus *Kiotina*.

lunata Kimmins (***Rhabdiopteryx***), 1947 : 722–724, figs 1A, 2A–F. Holotype ♂. Tibet, Rongbuk, 15500 ft, 22.v.1924 (*R. W. G. Hingston*) / Everest Exped. / Rhabdiopteryx lunata Kim., ♂ Type, det. D. E. Kimmins, 1946.

The figures were made from a paratype taken at the same time as the holotype.

lunulata Tillyard (***Eusthenia***), 1921*a* : 230–231, pl. 12, fig. 3. Holotype ♀. Cradle Mountain, [3000 ft], 21.i.[19]17 (*R. J. Tillyard*) / Eusthenia lunulata n. sp. ♀ Holotype, R.J.T.

luteicollis Walker (***Perla***), 1852 : 154–155. Holotype ♀. Walker type-label / Venezuela / Perla luteicollis [pencil written] / 46. PERLA LUTEICOLLIS [label cut from Walker's Catalogue].

One pair of wings has been removed and mounted between celluloid, and the abdomen has been cleared and placed in a small vial of glycerine. The wings are not entirely dark brown as indicated by Walker but have paler areas. Currently placed in *Macrogynoplax*.

[***luteicornis*** Stephens (***Nemoura***), 1836 : 142. I have been unable to recognize the type of this species. The specimen bearing the label 'luteicornis' is the example with the dissimilar antennae; as it is aberrant and does not appear to be an artefact, I am not considering it as a 'type'. It is *Nemoura cinerea* (Retzius).]

luteipes Kimmins (***Amphinemura***), 1947 : 728–730, figs 5A–D. Holotype ♂. [India], Bengal, Darjeeling distr., xi.1945 (*D. E. Kimmins*) / Amphinemura luteipes Kim., ♂ Type.

Type with wings mounted dry, remainder in canada balsam.

[***lycorias*** Newman (***Perla***), 1839 : 35. Newman quotes 'In the cabinets of the British Museum and the Rev. F. W. Hope.' The BMNH example has not been traced, unless it is the example described by Newport as *Acroneuria sonans*.]

magellanica Klapálek (**Kempnyia**), 1916 : 69. Holotype ♂. Straits of Magellan, Trinidad Channel, 24.ii.[18]79, flying over a mountain stream, H.M.S. 'Alert' / magellanica Klapálek. Currently placed as a synonym of *Pictetoperla gayi* (Pictet).

manevali Kimmins (**Isopteryx**), 1935 : 645–650, figs 1–8. Holotype ♂. France, Mt. Mézenc, 5.vi[19]33 (*H. Maneval*) / Beaten out of grass, on banks of stream, at foot of mountain, c. 1600 m / Chloroperla manevali (Kim.), ♂ TYPE.

Type mounted as two microscope preparations. Currently placed as a synonym of *Chloroperla* (*Siphonoperla*) *torrentium* (Pictet).

mclachlani Kimmins (**Protonemura**?), 1950*a* : 200–203, figs 5–8. Holotype ♂. Assam, Khasi Hills, McLachlan Collection / Protonemura ? mclachlani Kim., ♂ Holotype.

Mounted as two preparations, wings dry, remainder in canada balsam. Placed provisionally in *Protonemura*, in spite of the apparent absence of prosternal gill-vestiges.

media Stephens (**Chloroperla**), 1836 : 138–139. LECTOTYPE ♀. Stephens Coll. / media / Chloroperla media Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Another example, with a small label 'D' is possibly one of the series from Darenth Wood in June. Currently placed as a synonym of *Isoperla grammatica* (Scopoli).

media Walker (**Perla** (**Isogenus**)), 1852 : 145; Ricker, 1938 : 141. Holotype [? sex]. Walker type-label / Hudson's Bay, [Albany River, St Martins Falls] / 266 or 665, Perla media [Barnston Mss] / The abdomen does not belong to this specimen, P. W. Claassen / Perla media Walker, D. E. Kimmins det. 1969.

The abdomen has been glued on, and according to Claassen, does not belong to this specimen. Currently placed in *Paragnetina*.

minima Newport (**Perla**), 1848 : 388; 1851 : 430; Walker, 1851 : 183; Ricker, 1938 : 136. LECTOTYPE ♂. Hudson's Bay [Albany River, St Martins Falls] / 268 or 667, Perla minima / Allocapnia W. R[icker]. /

Type mounted on two microscope slides. Currently placed in *Allocapnia*. For notes on date of original publication, see *Pteronarcys californicus* Newport. (p. 339).

minor Klapálek (**Arcynopteryx**), 1912 : 22. Lectotype ♂. (Ricker, 1938 : 144, figs 25–26). Arctic America / Klapálek, minor / Perlodes (Arcynopteryx) minor Klap. ♂ 'Type' selected by Ricker, 1935–36 [label, D.E.K.].

Klapálek lists a pair in the BMNH collection, and I consider Ricker's statement (1938 : 144) 'Figured here are the ♂ genitalia, from the type' as equivalent to a selection of the ♂ as Lectotype. The ♂ genitalia were cleared by Kimmins and mounted in canada balsam for the purpose of Ricker's study. Currently placed as a synonym of *Arcynopteryx compacta* McL. The female has been labelled paralectotype.

minor Kimmins (**Spaniocerca**), 1938 : 575–576, figs 11, 12A–C. Holotype ♂. New Zealand, Arthur's Pass, 3000 ft, 16.i.1935 (*G. V. Hudson*) / Spaniocerca minor Kimmins, ♂ Type, det. D. E. Kimmins.

The figures in the original description are from a paratype.

minor Kimmins (**Trinotoperla**), 1951 : 78–79, figs 29a–e. Holotype ♂. [Australia], N[ew] S[outh] W[ales], Bolaro, xii.1935 (*R. J. Tillyard*) / Trinotoperla minor Kim., ♂ TYPE.

Mounted as three preparations, wings dry, body in de Faure's medium.

minuta Klapálek (**Anacroneuria**), 1922 : 89. Lectotype ♂ (Froehlich des. (i.l.) 1968). Brazil, Santarem / minuta Klapálek / Anacroneuria minuta Klap., ♂ Lectotype, des. Froehlich 1968.

Wings mounted dry, abdomen cleared and in glycerine. 1 ♂ paralectotype, Brazil, Tapayos.

mishmica Kimmins (**Protonemura**), 1950*a* : 203–204, figs 9–11. Holotype ♂. Assam, Mishmi Hills, Chhaglon, 5350 ft, 26.ii.1935 (*M. Steele*) / Protonemura mishmica Kim., ♂ TYPE.

Mounted as two microscope preparations, in canada balsam.

montana Kimmins (**Capnia**), 1944 : 735–736, fig. 11A. Holotype ♀. Sikkim, Tangu, 11500 ft, 26.iv.1924 (*R. W. G. Hingston*) Everest Exped.

Type in poor condition, cleared and mounted in canada balsam, on two slides.

montana Kimmins (**Protonemura**), 1941 : 89–93, figs 13, 14. Holotype ♂. Westmorland, Rydal Beck, 1700 ft, 4.viii.1940 (*Noel Hynes*) / Protonemura montana Kim., ♂ Holotype.

Holotype mounted on two microscope slides.

montivaga Kimmins (**Capnia**), 1947 : 736–737, fig. 11 B. Holotype ♀. Tibet, Lamna La, 15000 ft, 17.vi.1924 (*R. W. G. Hingston*) Everest Exped. / Capnia montivaga Kim., ♂ Type. 1946. D. E. Kimmins det.

Type in poor condition, abdomen mounted in canada balsam.

mosellae McLachlan (**Perla**), 1895 : 111–112. LECTOTYPE ♀. Type [McL. label] / Alf, 1894, Moselle / P. selysii Pict. v. mosellae McL. / Perla selysii Pict. var. mosellae McL. ♂ Holotype, D. E. Kimmins det. 1969.

There are 1 ♂ and 10 ♀ paralectotypes. Currently placed as a synonym of *Marthamea selysi* Pictet

moselyi Despax (**Chloroperla**), 1934 : 376–379, pls 5, fig. 16, 10, fig. 29, text-figs 30–32. Holotype ♂ (in 2% formaldehyde solution and on two microscope preparations). [France, Pyrénées-Oriéntales], Mont-Louis, R. Tet, 22.vi–2.vii.1923 (*M. E. Mosely*), Chl. Moselyi Despax ♂ Type.

Currently placed in *Isoperla*.

moselyi Despax (**Nemura**), 1934 : 265–267, figs 5–8. Holotype ♂ (in 2% formaldehyde solution). France, B[asses] Pyrénées, Eaux-Bonnes, 4–21.vi.1927 (*M. E. Mosely*), Nemura moselyi Despax, Type.

The generic name is now spelt *Nemoura*.

nebulosa Stephens [*nec* Latreille] (**Nemoura**), 1836 : 140. LECTOTYPE ♀. Stephens Coll. / nebulosa / Nemoura nebulosa Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Nemoura cinerea* (Retzius).

nigricoxa Kimmins (**Dinotoperla**), 1951 : 72, fig. 20d. Holotype ♀. New South Wales, Mt Kosciusko, 10.xii.1934 (*R. J. Tillyard*) / Dinotoperla nigricoxa Kim., ♀ TYPE.

Mounted as three preparations, wings dry, remainder in canada balsam.

nigrifrons Kimmins (**Leptoperla**), 1951 : 58–59, figs 10a–d. Holotype ♂. Tasmania (*J. W. Evans*) / Leptoperla nigrifrons Kim., ♂ TYPE.

Mounted as two preparations, wings dry, remainder in canada balsam.

nimborella Mosely (**Protonemoura**), 1930 : 250–252, figs 29–31. Holotype ♂. Switzerland, Klosters, 30.viii.1927 (*M. E. Mosely*) / Nemoura nimborella Mosely, ♂ Type.

Mounted as preparation in canada balsam. Of the two abdomens in this preparation, that in dorsal view should be considered the TYPE.

niponensis McLachlan (**Perla**), 1875 : 172. LECTOTYPE ♀. Type [McL. label] / Japan (*Pryer*) / Perla niponensis McL. / Perla niponensis McL., ♀ Lectotype, D. E. Kimmins det. 1969.

Of the two females referred to in the original description (in Wormald's collection), one is in McLachlan's collection and is designated Lectotype.

nitida Kimmins (**Neoperla**), 1950 : 184–185, figs 9, 10. Holotype ♂. S. India, Tinnevelly Dt., Naraikadu, 2500–3000 ft, 3–8.x.[19]38 / Neoperla nitida Kim., ♂ Type.

Mounted as two preparations, wings dry, remainder cleared and in canada balsam.

nitida Stephens (**Nemoura**), 1836 : 143. LECTOTYPE ♀. Stephens coll. / nitida / inconspicua Pict., picteti Mort., det. K. G. Blair / Nemoura nitida Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Placed as a synonym of *Nemurella picteti* Klapálek. There are also two paralectotype ♀♀.

nivata Kimmins (**Trinotoperla**), 1951 : 78, figs 27b, 28c. Holotype ♀. [Australia], Victoria, Snowy River, 3.i.1933 (*R. J. Tillyard*) / Trinotoperla nivata Kim., ♀ TYPE.

Mounted as three preparations, wings dry, body in canada balsam.

nubecula Newman (***Isogenus***), 1833 : 415. Holotype ♀. Isogenus Newman, Nubecula Newman, Ent. Mag. 1. 415, Worcester (*P. Burlingham*).

The label is much blackened and has been transcribed.

nubila Kimmins (***Amphinemura***), 1950 : 191–192, fig. 26. Holotype ♀. S. India, Coonoor, 6000 ft, 22–23.iv.1937 (*G. M. Henry*).

Type mounted as two preparations, body in canada balsam, wings dry. There is also a ♀ paratype, pinned.

olivacea Walker (***Perla*** (***Isogenus***), 1852 : 144–145; Ricker, 1938 : 143, figs 21–23. Holotype ♂. Walker Type label / Hudson's Bay [Albany River, St. Martin's Falls] / 267 or 666, Perla olivacea [Barnston Mss] / Isogenus olivacea Walk. Type [DEK writing].

The abdomen was removed and cleared, for study by W. E. Ricker, and has been mounted in canada balsam.

opposita Walker (***Perla*** (***Chloroperla***)), 1852 : 171; Kimmins, 1951 : 63–64, fig. 15 (lectotype designation.) Lectotype ♂. Walker Type label / V[an] D[iemens] L[and] / Dinotoperla opposita Walk., Type, det. D. E. Kimmins, i.1940.

The abdomen is mounted in de Faure's medium, attached to pin, and one pair of wings mounted on a microscope slide. I consider my statement (1951: 'I have selected as type the female from Mr Smith's collection, labelled V. D. L., 51–153' as equivalent to a designation of the lectotype. Currently placed in the genus *Dinotoperla*.

oxylepis Despax (ssp. of ***Chloroperla grammatica***), 1936 : 357, pl. 3, fig. 12, pl. 7, fig. 23, text-figs 10–12. Holotype ♂ (in 2% formaldehyde solution and on two preparations). [France], Le Lioran, 9–19.vi.[19]24 (*M. E. Mosely*), Chl. gr. oxylepis Despax, Type.

Currently placed in the genus *Isoperla*. Despax quotes Gerardemer and Le Lioran in the type-series, but has labelled the Le Lioran example as Type.

[***pallicornis*** Stephens (***Nemoura***), 1836 : 143. Type not recognized. The specimen bearing this label agrees in wing expanse with the description but the antennae, far from being pale, are dark reddish brown. The specimen bears a label 'H' [?Hertford] but I am inclined to the view that the label 'pallicornis' has been wrongly placed upon it, and do not consider it to be a type. It is a ♀ *Nemurella picteti* Klapálek. Morton doubtfully synonymized this species with *cambrica* or *inconspicua* [*picteti*]. The labelled specimen is certainly the latter.]

pallida Stephens (***Chloroperla***), 1836 : 139–140. LECTOTYPE ♀. Stephens coll. / pallida / Chloroperla pallida Steph., ♀ Lectotype, D. E. Kimmins det.

Currently placed as a synonym of *Chloroperla torrentium* (Pictet).

pallida Stephens (***Nemoura***), 1836 : 141. LECTOTYPE ♀. Stephens Coll. / pallida / Nemoura pallida Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Nemoura cinerea* (Retzius).

pallipes Stephens (***Nemoura***), 1826 : 142. Holotype ♂. Stephens Coll. / pallipes / standfussi (not inconspicua Pict.), det. K. G. Blair. / Amphinemura standfussi Ris ♂, D. E. Kimmins det.

This dried example was determined as *A. standfussi Ris* by Blair, and while I had little doubt as to the accuracy of his identification, I have cleared the abdomen and can confirm his identification. Illies (1966, *Tierreich* **82** : 47) treats *Nemoura pallipes* Stephens as a *nomen oblitum*, thus avoiding the suppression of the well-known name *Amphinemura standfussi* Ris.

pedestris Kimmins (***Capnia***), 1947 : 731–732, figs 7A–C. Holotype ♂. Tibet, Everest base camp, Rongbuk Glacier, 16500 ft, v.1922 (*T. G. Longstaff*) / Capnia pedestris Kim., ♂ Type.

The type has been cleared and mounted in canada balsam. Currently placed in the genus *Allocapnia*.

perfecta Walker (***Nemoura***), 1852 : 191; Ricker, 1938 : 133. Holotype ♂ (mounted on three microscope slides). Walker type-label / R [on green label] / Nova Scotia (Redman) / 51. NEMOURA PERFECTA [label cut from Walker catalogue] / Nemoura WR. (punctipennis Claassen syn) [W. E. Ricker's writing, 1935–36].

Currently placed in *Nemoura* (*Paranemoura*).

perpicta Klapálek (***Togoperla***), 1921 : 63, 64. LECTOTYPE ♂. Hong Kong, Feb.–May (*J. J. Walker*) / infuscata Klapálek / Togoperla perpicta Klap., ♂ Lectotype, D. E. Kimmins det. 1969.

There are 4 ♂, 1 ? paralectotypes in BMNH. The explanation of the absence of correct Klapálek det. labels appears to be due to a change of mind between labelling the specimens and the posthumous publication of the description.

perspicillata Klapálek (***Gibosia***), 1916 : 61. LECTOTYPE ♀. N[orth] China / triangle of black paper / perspicillata Klapálek / Gibosia perspicillata Klap., ♀ Lectotype, D. E. Kimmins det. 1969.

There are also 2 ♀ paralectotypes labelled Hong Kong.

postica Walker (***Perla*** (***Isogenus***)), 1852 : 144; Ricker, 1938 : 143–144. Holotype ♀. Walker Type label / [Mackenzie River], Arctic Amer[ica] / Perla (Isogenus) postica Walk., Holotype ♀, det. D. E. Kimmins, 1969.

The holotype lacks part of its abdomen, but the presence of eggs in the remainder of the abdomen leaves no doubt as to its sex. Currently placed as a synonym of *Diura bicaudata* (L.).

[***praecox*** Morton (***Nemoura***), 1894 : 566–567, pl. 13, Nemoura praecox, figs 1–2.

The BMNH has two syntypes (♂, ♀) given to McLachlan, labelled Cleghorn, 13.iii / PRAECOX / Morton's type, 1894 [McL. writing] / Nemoura praecox Mort., syntype, D. E. Kimmins det. 1969.

The lectotype should be chosen from Morton's collection, Royal Scottish Museum, Edinburgh.]

prasina Newman (***Chloroperla***), 1845 : 853. Holotype ♀. N[ew] Zea[land] / Saunders [collection] / Chloroperla prasina, New Zealand.

One pair of wings mounted dry, abdomen in canada balsam. Currently placed in *Stenoperla*.

proteus Newman (***Pteronarcys***), 1838 : 177. Lectotype ♂ (Smith, 1917 : 453). E. Doubleday, Trenton Falls, New York, Pteronarcys Proteus Newm. / Pteronarcys proteus Newm. ♂.

This ♂ had at some time acquired an incorrect register number applying to a Trichopteron; this has been corrected. The ♀ type of *proteus* has been shown by Smith (1917) to be incorrectly associated with the ♂ and is in fact the ♀ of *Pt. comstocki* Smith.

pseudocingulata Mendl (***Leuctra***), 1968 : 311–314, figs 5–7. Holotype ♂. France, Vosges, Retournemer, 7–31.vii.1930 (*M. E. Mosely*) / Leuctra carinthiaca Kempny, det. M. E. Mosely / Leuctra pseudocingulata Mendl, ♂ Holotype, D. E. Kimmins det. 1968.

Holotype mounted as a preparation in canada balsam. The holotype and paratypes were labelled by Kimmins at Herr Mendl's request.

purpurescens Tillyard (***Eusthenia***), 1921 : 230, pl. 13, fig. 6. Holotype ♀. [Tasmania], Hobart, 6.xii.[19]13 (*G. H. Hardy*) / Eusthenia purpurescens sp. n. ♀ Holotype, R.J.T.

♂ Allotype also in BMNH.

pusilla Stephens (***Nemoura***), 1836 : 142. LECTOTYPE ♂. Stephens Coll. / pusilla / Nemoura pusilla Steph. ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed as synonym of *Nemoura cinerea* (Retzius).

pyrenaica Mosely (***Protonemoura***), 1930 : 250, figs 29–31. Holotype ♂. France, Basses-Pyrénées, Eaux Chaudes, 10.vii.1929 (*M. E. Mosely*) / Protonemoura pyrenaica Mosely ♂ Type.

Type mounted as preparation in canada balsam.

quadridentata Kimmins (***Protonemura***), 1950*a* : 205–206, fig. 12. Holotype ♀. Khasis, Nat[ive] Coll[ector] / Protonemura quadridentata Kim., ♀ Type, D. E. Kimmins det. 1948.

Type pinned, with abdomen mounted in canada balsam.

regalis Newman (***Pteronarcys***), 1838 : 176. Holotype ♀. [The label is much blackened, but by oblique lighting the following data can be read] Pteronarcys Newman, Regalis Newman, Ent. Mag. V. 176, Canada, *E. Newman*.

The abdomen is now missing.

renata Kimmins (***Amphinemura***), 1950*a* : 206–208, figs 13–16. Holotype ♂. Assam, Mishmi Hills, Minutang, 3900 ft, 17.ii.1935 (*M. Steele*) / Amphinemura renata Kim., ♂ Holotype.

Holotype mounted as two preparations, wings dry, remainder in canada balsam.

reticulata Kimmins (***Leptoperla***), 1951 : 57–58, figs 9a–b. Holotype ♀. [Australia], New S[outh] Wales, Mt Kosciusko, Spencers Creek, xii.1932 (*R. J. Tillyard*) / Leptoperla reticulata Kim., ♀ TYPE.

Mounted as three preparations, wings dry, remainder in canada balsam.

reticulata (Klapálek Mss) Tillyard (***Eustheniopsis***), 1921*a* : 233. Holotype ♀. Tasmania / reticulata Klapálek / Eustheniopsis reticulata Till., ♀ Holotype, D. E. Kimmins det. 1969.

[***rufescens*** Stephens (***Chloroperla***), 1836 : 139. Type not recognizable from description.]

ruficosta Tillyard (***Tasmanoperla***), 1924 : 193. Holotype ♀. N[ew] S[outh] W[ales], [Mount] Kosciusko, [5500 ft], 24.xi.1921 (*R. J. Tillyard*) / Tasmanoperla ruficosta Till., Holotype ♀, R.J.T.

rugosa Kimmins (***Leptoperla***), 1951 : 56–57, figs 8a–e. Holotype ♂. Australia, F[ederal] C[apital] T[erritory], Lee's Springs, xi.[19]32 (*R. J. Tillyard*) / Leptoperla rugosa Kim., ♂ TYPE.

Mounted as one preparation, in canada balsam.

scutata Barnard (***Aphanicercella***), 1934 : 540–541, figs 16a–f. Holotype ♂. [South Africa], Wellington Mts, [Witte River], ix.1933 (*H. G. W[ood]*) / Aphanicercella scutata Brnd, Holotype ♂, ♀ [Barnard's writing].

Holotype ♂, paratype ♀ in 2% formaldehyde solution.

scutigera Kimmins (***Protonemura***), 1950*a* : 199–200, fig. 4. Holotype ♀. Assam, Mishmi Hills, Delai Valley, Chanliang, Alt. 4840 ft, 25.xi.1936 (*M. Steele*) / Protonemura scutigera Kim., ♀ TYPE.

Mounted as two preparations in canada balsam.

serricauda Kimmins (***Dinotoperla***), 1951 : 62–63, figs 14 a–e. Holotype ♂. Tasmania, R. Ouse, 4.ii.1933 (*R. J. Tillyard*) / Dinotoperla serricauda Kim., ♂ Type.

Mounted as three preparations, wings in de Faure's medium, remainder in canada balsam.

signata Walker (***Perla***), 1852 : 157. Lectotype ♀. Walker type label / Venezuela / 54. PERLA SIGNATA [label cut from Walker catalogue] / Anacroneuria signata Walker, Lectotype, det. Froehlich, 1968.

Currently placed in *Anacroneuria*.

sonans Newport (Barnston Mss) (***Perla***), 1851 : 447–449. Holotype ♀. 265 or 664, Perla sonnans / abnormis, Klapálek / Perla sonans Newport.

Perla sonans (Barnston Mss) was published in synonymy with *Perla abnormis* Newman by Newport and would not normally be available, but Ricker (1938 : 140) treats it as an available name and thus validates it (Art. 11, d, Intern. Rules, 2nd edition). He gives St Martin's Falls, Albany River, Ontario as the type-locality, but there is no such indication on the specimen. Barnston's label gives the specific name as '*sonnans*', but the published name is '*sonans*'.

Currently placed in *Acroneuria*, probably a synonym of *abnormis* Newman.

spectabilis Westwood (in Griffiths *et al.*) (***Eusthenia***), 1832 : 348; Newman (1839 : 33). LECTOTYPE ♀. 41.9.25.2 [New Holland, V. D. L., In exchange with Westwood] / Eusthenia spectabilis Westw., in Griff. An. K., N. Holl., (V.D.L.). / Eusthenia spectabilis Westwood, ♀ Lectotype, D. E. Kimmins det. 1969.

There is one paralectotype ♀.

The selection of a type-specimen for this species has been something of a problem, which has been made more difficult by the fact that Westwood himself did not publish a description of the species, Griffith's account being based upon notes supplied by Westwood.

The first description (1832 : 348) is very brief 'The body is dark brown, the upper wings pale, with a brown spot in each cell; the anterior margin purplish brown, and with a whitish fasciae rather beyond the centre: the hinder wings red, with a very broad bluish-black margin.'

The second description, by Newman (1839 : 33) is more detailed and agrees well with the two examples in BMNH determined by Westwood (and probably seen by Newman before they reached the BMNH). One was received from Westwood in exchange in 1841 and the other from the Entomological Club in 1844. The chief differences in the two descriptions are that Griffiths (1832) does not mention the conspicuous reddish streak along the radius in the fore wing, and the specimens do not show a pale fore wing with a brown spot in each cell. They are in fact brownish with a purple tinge, the cross-veins finely bordered with white. It is possible that Griffiths meant that the cells were almost entirely filled with brownish.

Tillyard based his interpretation of the species on these two examples, which were long ago labelled as syntypes, and I have therefore made the above lectotype selection, which is in conformity with current usage.

spio Newman (**Chloroperla**), 1839 : 86. Holotype ♂. Sierra Leone / Chloroperla Spio Newman, Mag. Nat. Hist. n.s. III p. 86 [with on reverse], presented by the Rev^{d}. D. F. Morgan.

Currently placed in the genus *Neoperla*.

subarmata Despax (ssp. of ***Chloroperla grammatica***), 1924 : 354–357, pl. 8, fig. 22, text-figs 7–9. Holotype ♂ (in 2% formaldehyde solution and as microscope preparation). Angl[eterre], Capel Curig [vi.[19]19] (*M. E. Mosely*).

The locality 'Capel Curig' is in fact in the Welsh county of Caernarvonshire. Currently placed in the genus *Isoperla*.

suffusa Walker (***Perla***), 1852 : 154. LECTOTYPE ♀. Walker type label / Nepal, with on reverse 'Hardwicke Bequest' / Perla suffusa Walker, ♀ Lectotype, D. E. Kimmins det. 1969.

The type-series consists of two ♀ syntypes, both from Nepal. Walker's description agrees fairly well, although one venational character agrees only in one out of four fore wings. This is the number of cross-veins in the terminal areolet (space between costa and R_1 beyond the termination of *Sc*), which is said to be seven. The numbers are actually 4, 5, 5 and 7. I have selected as Lectotype the example which has seven cross-veins in the terminal areolet of one fore wing. The second example becomes a paralectotype.

Currently placed as the type-species of *Brahmana* Klapálek, 1916.

sulcicollis Stephens (***Nemoura***), 1836 : 143. Syntype [?sex]. Stephens Coll. / Nemoura sulcicollis Steph., D. E. Kimmins det. 1969.

In the Stephens Collection there is one example (now lacking abdomen) which agrees reasonably well with the original description, and although it does not carry a specific label from the Stephens Collection, I am prepared to accept it as at least one of the syntypes. Stephens' collection of Nemouridae was studied by Morton (1894 : 571) and *sulcicollis* was placed by him as a synonym of *Nemoura cinerea* Olivier, 1811. The latter is a homonym of *Nemoura cinerea* (Retzius, 1784) and Brinck (1949 : 37) has used the name *Nemoura sulcicollis* Stephens, 1836 as the first available synonym for *Nemoura cinerea* Olivier, 1811. Currently placed in the genus *Amphinemura*.

tasmanica Kimmins (***Leptoperla***), 1951 : 51–53, figs 5a–e. Holotype ♂. Tasmania, Gouldt County, 10.ii[19]33 (*R. J. Tillyard*) / Leptoperla tasmanica Kim., ♂ TYPE.

Holotype mounted as three preparations, two of wings (in de Faure's medium), remainder in canada balsam.

tasmanica Tillyard (***Spaniocerca***), 1924 : 195, fig. 3. Holotype ♀. Tas[mania], Mount Wellington, 31.i.[19]17 (*R. J. Tillyard*) / Spaniocerca tasmanica Till., Holotype ♀, R.J.T.

Holotype (seriously damaged by pests in Tillyard collection) is now represented by two anterior and one posterior wings.

tenebrosa Klapálek (***Kempnyia***), 1916 : 69–70. LECTOTYPE ♀. Theresopolis / 22.ix. [18]87 / triangle of black paper / tenebrosa Klapálek / Kempnyia tenebrosa Klap., ♀ Lectotype, D. E. Kimmins det. 1969.

One paralectotype (without abdomen). Currently placed as synonym of *Kempnyia klugi* (Pictet).

terminalis Walker (***Perla***), 1852 : 155–156. LECTOTYPE ♀. Walker type label / East Indies / India / 49. PERLA TERMINALIS. / Perla terminalis Walker, ♀ Lectotype, D. E. Kimmins det. 1969.

The second example is in less good condition and has been marked paralectotype ♀. Currently placed in *Marthamea* and doubtfully synonymized with *M. vitripennis* by Klapálek, 1923 : 98.

tibetana Kimmins (***Capnia***), 1947 : 734–735, figs 10A–D. Holotype ♂. Tibet, Gaotsa, 12300 ft, 21.iii.1933 (*Raymond Greene*), Mt. Everest Exped. / Capnia tibetana Kim., ♂ Type.

Type mounted on two microscope slides, in canada balsam.

tillyardi Kimmins (***Spaniocerca***), 1951 : 87–88, figs 37a–e. Holotype ♂. [Australia], F[ederal] C[apital] T[erritory], Lee's Springs, xi.1932 (*R. J. Tillyard*) / Spaniocerca tillyardi Kim., ♂ TYPE.

Mounted as three preparations, wings dry, head, mouth parts and abdomen, thorax and legs in canada balsam.

tinctipennis McLachlan (***Perla***), 1875 : 71. Holotype ♀. Type [McL. label] / Japan, Pryer / Perla tinctipennis McL.

Currently placed in *Paragnetina*.

tragula Kimmins (***Amphinemura***), 1950 : 189–191, figs 23–25. Holotype ♂. Turkestan / 1 / Amphinemura tragula Kim., ♂ TYPE.

Type cleared and mounted in canada balsam.

transmarina Newman (***Chloroperla***), 1838 : 499–500. Lectotype ♀ (Ricker, 1938 : 146, figs 32, 33). Ent. Club / Transmarina Newman, Ent. Mag. V.499, N. America, *R. Foster* / Chloroperla transmarina Newman, ♀ Lectotype, W. E. Ricker det. 1935–36.

The data label is now black and the data discernable only with difficulty. Ricker, in effect, selected this example by his statement 'The ♀ type, in the British Museum'. The other examples (implied in Newman's description) have probably been transferred to other species. Currently placed in the genus *Isoperla*.

transversa Klapálek (***Perlodes***), 1912 : 40. Holotype ♀. Rheinwald (*W. Bennett*) / Ent[omological] Club / transversa, Klapálek. /

Synonym of *Perlodes intricata* (Pictet).

tricolor Klapálek (***Togoperla***), 1921 : 65. Holotype ♀. Kiu-Kiang / tricolor Klapálek / Togoperla tricolor Klapálek, ♀ Holotype, D. E. Kimmins det. 1969.

trijuncta Walker (***Perla***), 1852 : 153; Ricker, 1938 : 140. Holotype ♀. Walker type label / Georgia / 43. PERLA TRIJUNCTA [label cut from Walker Catalogue].

Currently placed as a synonym of *Acroneuria arenosa* Pictet.

turkestanica Kimmins (***Capnia***), 1950 : 187–189, figs 14–18. Holotype ♂. 7 / 517 / Turkestan / Capnia turkestanica Kim., D. E. Kimmins det. 1948.

Wings mounted dry, abdomen in canada balsam.

uncata Kimmins (***Filchneria***), 1947 : 737–739, figs 12, 13A–E. Holotype ♂. Tibet, Yatung, 10000 ft, 3.iv.1924 (*R. W. G. Hingston*) Everest Exped.

Type ♂ cleared and mounted in canada balsam, on two slides.

uniformis Kimmins (***Dinotoperla***), 1951 : 68–69, figs 19a–g. Holotype ♂. Australia, N[ew] S[outh] W[ales], Rule's Point, 4450 ft, 30.xii.[19]34 [*R. J. Tillyard*] / Dinotoperla uniformis Kim., ♂ TYPE.

Mounted as three preparations, wings in de Faure's medium, remainder in canada balsam.

varia Kimmins (***Leptoperla***), 1951 : 54–56, figs 7a–d. Holotype ♂. Tasmania, L[ake] St Clair, 6.ii.1933 (*R. J. Tillyard*) / Leptoperla varia Kim., ♂ TYPE.

Mounted as two preparations, wings in de Faure's medium, remainder in canada balsam.

variegata Stephens (***Nemoura***), 1836 : 144. Holotype ♀. Stephens Coll. / variegatus / Nemoura variegata Steph., ♀ Holotype, D. E. Kimmins det. 1969. / Brachyptera risi Morton, ♀, D. E. Kimmins det. 1969.

Nemoura variegata Stephens is a homonym of *Nemoura variegata* (Olivier) and takes the name of the first available synonym, *Brachyptera risi* Morton.

venosa Kimmins (***Neoperla***), 1950 : 183–184, figs 7–8. Holotype ♂. S. India, Kodaikanal, 7000 ft, 31.iii.[19]36, BM-CM Exped. to S. India, 1936 / Neoperla venosa Kim., det. D. E. Kimmins.

Wings mounted dry, ♂ genitalia in canada balsam.

[***venosa*** Stephens (***Chloroperla***), 1836 : 139. Type not recognizable from description.]

vernalis Newport (***Capnia***), 1848 : 388; 1851 : 451; Walker, 1851 : 176; Ricker, 1938 : 135–136, figs 10–12. Lectotype ♂ (Ricker, 1938). Hudson's Bay, [Albany River, St Martin's Falls] / Originally mounted with female / Capnia vernalis Newp., ♂ Lectotype, W. E. Ricker, 1938.

The lectotype has wings mounted dry and abdomen in canada balsam.

xanthenes Newman (***Perla***), 1838 : 478. Lectotype ♀ (Needham & Claassen, 1925 : 194). Georgia / Perla xanthenes Newman ♀ Type, det. D. E. Kimmins.

Currently placed in *Acroneuria*. The ♂ of *xanthenes* Newman is placed as a synonym of *Perla kansensis* Banks.

MEGALOPTERA

affinis Stephens (***Raphidia***), 1836 : 131. LECTOTYPE ♀. Stephens Coll. / affinis / Raphidia affinis Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Raphidia* (*Atlantoraphidia*) *maculicollis* Stephens. A second labelled example appears to be conspecific and has been labelled ♀ paralectotype.

albipennis Walker (***Hermes***), 1853 : 207–208; Kimmins, 1949 : 766–768, text-fig. 1. LECTOTYPE ♀. Walker type label / Nepal, [with on reverse] Hardwicke Bequest / H. albipennis, Nepaul / Hermes albipennis Walker, ♀ Lectotype, D. E. Kimmins det. 1969.

This is the example referred to as '♀ holotype' in Kimmins, 1949 : 767. Currently placed in *Protohermes*.

anticus Walker (***Hermes***), 1853 : 205. Holotype ♀. Walker type label / China / H. anticus, China / Hermes anticus Walker, Holotype, D. E. Kimmins det. 1969.

Weele (1909 : 36) states that the type is a mature ♀; the abdomen is now missing. Currently placed as a synonym of *Neochauliodes sinensis* (Walker).

assamensis Kimmins (***Protohermes***), 1948 : 773–775, text-figs 11–13. Holotype ♂. Assam Protohermes assamensis Kim., ♂ Type, det D. E. Kimmins.

Abdomen cleared and mounted in canada balsam.

assimilis Albarda (***Raphidia***), 1891 : 144–146, pl. 8, fig. 23. Holotype ♀. Type [McL. label] / 47 / 61 / Vancouver I[sland] (*Mathew*) / assimilis Alb. / H. & U. Aspöck vid. 1968.

Abdomen cleared and preserved in glycerine. Currently placed in the genus *Agulla*.

auritus Kimmins (***Platyneuromus***), 1928 : 369–370, figs 5–7. Holotype ♂. Honduras / Platyneuromus auritus Kimmins, ♂ Type, det. D. E. Kimmins / Doeringia auritus Kimmins, det. D. E. Kimmins, 1932.

australica Kimmins (***Archichauliodes***), 1954 : 424–425, fig. 6. Holotype ♂. N[ew] S[outh] W[ales], Upper Murrumbidgee R., Rule's Point, 4500 ft, 20.xii.1934 (*R. J. Tillyard*) / Abdomen in slide cabinet / Archichauliodes australica ♂ Kim., D. E. Kimmins det.

It may be pointed out that in the published data of the holotype, the sex is incorrectly given as ♀.

australiensis Tillyard (***Stenosialis***), 1919 : 824. Holotype ♀. Q[ueensland], Mt Tambourine, 17.xii.[19]16 (*W. H. Davis*) / Stenosialis tambourinensis Till., TYPE, R.J.T. / Stenosialis australiensis Till., ♂ TYPE, det. D. E. Kimmins.

The type is very much compressed laterally. Tillyard evidently changed his mind about the specific name, but omitted to replace the determination label. Currently placed in *Austrosialis*.

batesi McLachlan (***Cordyalis***), 1868 : 232–233, pl. 8, fig. 1. Holotype ♀. Ega (*Bates*) / Corydalis batesii McL. (Type).

Generic name now spelt *Corydalus*.

bellulus Banks (***Protohermes***), 1931 : 412–413, fig. 18. LECTOTYPE ♂. B[ritish] N[orth] Borneo, Mt Kinabalu, Lumu Lumu, 5500 ft, 8.iv.1929 (*H. M. Pendlebury*) / Ex F.M.S. Museums / Protohermes bellulus Bks, type / Protohermes bellulus Banks, ♂ Lectotype, D. E. Kimmins det. 1969.

bicolor Albarda (***Raphidia***), 1891 : 152–154, pl. 9, fig. 22. LECTOTYPE ♂. Type [McL. label] / Colorado / 42 / bicolor Alb. / Agulla bicolor Alb. ♂ Type, det. D. E. Kimmins / Raphidia bicolor Alb., ♂ Lectotype, D. E. Kimmins det. 1969.

Apex of abdomen cleared and mounted in canada balsam. There are 3 ♂ and 6 ♀ paralectotypes in BMNH. Currently placed in *Agulla*.

biconicus Kimmins (***Protochauliodes***), 1954 : 443–444, fig. 22. Holotype ♂. [Australia], N[ew] S[outh] Wales, Nowra, 8.x.1928 (*F. A. Rodway*) / Abdomen in slide cabinet / Protochauliodes biconicus Kim., ♂, D. E. Kimmins det. 1953.

bowringi McLachlan (***Chauliodes***), 1867 : 260 (= *Hermes sinensis* Walker, 1852 : 203, *nec* 1852 : 199). Holotype ♀. Hongkong / H. sinensis, China / Chauliodes bowringi McL., Type, D. E. Kimmins det.

Currently placed in *Neochauliodes*.

burmana Aspöck (***Inocellia***), 1968 : 63; 1968*a* : 188, fig. 3. Holotype ♂. N. E. Burma, Hpungan, 17.iii.1934 (*R. Malaise*) / Inocellia burmana Aspöck & Aspöck, 1968, Holotypus.

Abdomen cleared and preserved in glycerine. The first reference is a *nomen nudum*.

californicus Walker (***Chauliodes***), 1853 : 199. Holotype ♀. Walker type label / California [From M. Hartweg's collection] / C. californicus, California / Abdomen in slide cabinet / Chauliodes californicus Walker, ♂ Holotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Neohermes*.

chilensis Kimmins (***Archichauliodes***), 1954 : 425–427, figs 7, 8. Holotype ♂. Chili (*Calvert*) / Abdomen in slide cabinet / Archichauliodes chilensis Kim., ♂, D. E. Kimmins det. 1953.

chilensis McLachlan (***Sialis***), 1870 : 145–146. Holotype ♂. Type [McL. label] / Chili / Sialis chilensis McL.

Currently placed in the genus *Protosialis*. Weele (1910 : 77), from a photograph of McLachlan's type, suggests it is a female, because the antennae did not appear to be hairy. They are in fact pilose and the type is definitely a male.

continentalis Weele (***Parachauliodes***), 1909 : 259; 1910 : 60, fig. 47, pl. 4, fig. 30; Kimmins, 1954 : 432, text-fig. 12. LECTOTYPE ♂. [Korea], Ssu-shima, 27.v.1891, H.t. / Metachauliodes continentalis Weele, type / Parachauliodes continentalis Weele, ♂ Lectotype, D. E. Kimmins det. 1969.

The generic name *Metachauliodes* is a *nomen nudum* and was evidently replaced at the last minute by Weele with *Parachauliodes*, the same name occurring twice (Weele, 1910 : 61) in error for *Parachauliodes*. There is one ♀ paralectotype in BMNH.

corripiens Walker (***Hermes***), 1860 : 180. LECTOTYPE ♀. [No locality label] / Walker type label / Saunders [Coll.] / corripiens / Hermes corripiens Walker, ♀ Lectotype, D. E. Kimmins det. 1969.

Walker's measurements suggest that he had more than one example; and there is a second example from Brazil, also from the Saunders collection, which may be one of the type-series. It lacks the anterior spots on pronotum, which Walker says may be obsolete. Both specimens are a little larger than the dimensions given by Walker.

costalis Walker (***Hermes***), 1853 : 207; Kimmins, 1949 : 775–778, figs 14–18. LECTOTYPE ♂. Walker type label / North China / H. costalis, N. China / Hermes costalis Walker, ♂ Lectotype, D. E. Kimmins det. 1969.

Lectotype with abdomen cleared and mounted in canada balsam. The second example has been labelled paralectotype ♀. Currently placed in the genus *Protohermes*.

crassicornis McLachlan (***Corydalis***), 1867 : 233–235, pl. 8, fig. 2. Holotype ♂. Texas / Corydalis crassicornis McL. (Type).

Generic name now spelt *Corydalus*.

deceptor Kimmins (***Archichauliodes***), 1954 : 423–424, fig. 5. Holotype ♂. Queensland, Toowoomba, 2000 ft, 10.xii, 1884 / Abdomen in slide cabinet Chauliodes guttifer McL. [McL.det.] / Archichauliodes deceptor Kim., ♂ D. E. Kimmins det. 1953.

decimmaculatus Walker (***Hermes***), 1860 : 180; Kimmins, 1949 : 768–770, figs 2–4. Holotype ♂. [No locality data] / Saunders [coll.] / 10-maculatus W. / Hermes decimmaculatus Walker, ♂ Holotype, D. E. Kimmins det. 1969.

Abdomen mounted in canada balsam.

disjunctus Walker (***Chauliodes***), 1866 : 334. Holotype ♀. Walker type label / Brit[ish] Columb[ia] / Brit[ish] Columb[ia], Chalukweyuh Lake, ix.1859 / Chauliodes disjuncta.

Currently placed in the genus *Dysmicohermes*.

diversus Walker (***Hermes***), 1853 : 205; Kimmins, 1938*a* : 354–358, pl. 13A, text-figs 1, 2, 5, 6, 9, 10 [designation of type]. Lectotype ♂ (Kimmins, 1938). Walker type label / N[ew] Zeal[an]d / Hermes diversus Walker ♂, selected as type by D. E. Kimmins, Feb. 1938.

The type has the abdomen cleared and mounted in canada balsam. Currently placed in the genus *Archichauliodes*.

dubitatus Walker (***Hermes***), 1854 : 204; Kimmins, 1938*a* : 354–358, pl. 13, text-figs 3, 4, 7, 8. Holotype ♀. Walker type label / 26 / H. dubitatus [no locality] / Abdomen in slide cabinet / Protochauliodes dubitatus Walker, ♀ Type, det. D. E. Kimmins.

Locality possibly South American. Currently placed in the genus *Protochauliodes*.

esbenpeterseni Kimmins (***Leptochauliodes***), 1930 : 663–665, 2 figs. Holotype ♂. C[ape] C[olony], Hott[entots] Holl[and] Mts, 4000 ft, Caledon, 1916 ([*K. H. Barnard*) / Abdomen in slide cabinet / Leptochauliodes esbenpeterseni Kimmins ♂, det. D. E. Kimmins, 1930 / Taeniochauliodes ochraceopennis Esb.-Pet. ♂, det. D. E. Kimmins.

fasciatus Walker (***Chauliodes***), 1853 : 201. LECTOTYPE. Walker type label / 'N[ew] Holl[and]' / C. fasciatus, Australia / Chauliodes fasciatus Walker, ♂ Lectotype, D. E. Kimmins det. 1969.

Of the two original examples, the above mentioned specimen is the only one bearing locality and determination labels. There is a smaller example, without any data whatever, but I feel that it would be unwise to mark it as a paralectotype.

fenestralis McLachlan (***Neuromus***), 1869 : 42–43. LECTOTYPE ♂. Dhargeeling / Neuromus fenestralis McL. / Neuromus fenestralis fenestralis McL., ♂ Lectotype, D. E. Kimmins det. 1969.

The second ♂ syntype has been labelled paralectotype. Currently placed in the genus *Neoneuromus*.

ferrugineus Walker (***Sialis***), 1853 : 195. Holotype ♂. Walker type label / Georgia [From Mr Abbot's collection] / S. ferrugineus N. Amer[ica] / Sialis ferrugineus Walk., ♂ Holotype,

D. E. Kimmins det. 1969.

Currently placed as a synonym of *Sialis americana* (Rambur).

fletcheri Kimmins (***Neochauliodes***), 1954 : 434, fig. 13. Holotype ♂. India, Assam, Shillong, 5000 ft, 26.vi.–10.vii.1928 (*T. Bainbrigge Fletcher*) / Abdomen in slide cabinet / Neochauliodes fletcheri Kim., ♂, D. E. Kimmins det. 1953.

forcipatus Kimmins (***Ctenochauliodes***), 1954 : 429–430, fig. 11. Holotype ♂. China, [Szechwan?], Kwanshien, vii.1930 (*G. M. Franck*) / Abdomen in slide cabinet / Ctenochauliodes forcipatus Kim., ♂, D. E. Kimmins det. 1953.

fraternus McLachlan (***Chauliodes***), 1869 : 37. Holotype ♀. N. China / Chauliodes fraternus McL.

Currently placed as ssp. of *Neochauliodes sinensis* (Walker).

fulvostigmata Aspöck (***Inocellia***), 1968 : 63; 1968*a* : 184–187, figs 1–2. Holotype ♂. 11.viii. / Kashmir, Gulmarg, 11.viii.[19]31 (*T. B. Fletcher*) / Inocellia fulvostigmata Aspöck et Aspöck, 1968, Holotypus.

The first reference is a *nomen nudum*.

fuscinata Aspöck (***Inocellia***), 1964 : 62; 1965 : 352–353, fig. 22. Holotype ♂. Turkey, Amasya, 9.vi.1959 (*K. M. Guichard*) / Raphidia fuscinata H. et U. Aspöck, Holotypus ♂.

Currently placed in the subgenus *Turcoraphidia*. Abdomen of holotype cleared and preserved in glycerine.

guttiferus Walker (***Hermes***), 1853 : 204; Kimmins, 1954 : 419–421, figs 2, 3. Holotype [?sex]. Walker type label / [locality unknown] / guttifera / Hermes guttifera Walker, holotype, D. E. Kimmins det. 1969.

Currently placed in the genus *Archichauliodes*.

hageni Albarda (***Inocellia***), 1891 : 171–172, pl. 11, fig. 33. Holotype ♀. Type [McL. label] / 57 / [California], S[an] Francisco (*Edwards*) / Hageni, Alb.

hecate McLachlan (***Corydalis***), 1866 : 1–2, pl. 20. LECTOTYPE ♂. Brazil / Corydalis hecate McL., Type / Corydalis cephalotes Rbr [McL. writing] / Corydalis hecate McL., ♂ Lectotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *C. cephalotes* Rambur.

ignicollis Tillyard (***Austrosialis***), 1919 : 823. Holotype ♂. [Tasmania], Maria Isl[and], 29 xii.[19]13 / Austrosialis ignicollis Till. Type, R.J.T.

inamabilis McLachlan (***Corydalis***), 1867 : 235–236, pl. 8, fig. 3. Holotype ♂. Texas / Corydalis inamabilis McL. (Type).

Generic name currently spelt *Corydalus*.

indecisus Walker (***Hermes***), 1953 : 203–204. Holotype ♀. Walker type label / indecisa / H. indecisus / Hermes indecisus Walker, ♀ Holotype, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Chauliodes rastricornis* (Rambur), a North American species.

infectus McLachlan (***Neuromus***), 1869 : 41; Weele, 1910 : 37 [type restricted to BMNH example]. Lectotype ♂. [India], Dhargeling / Neuromus infectus McL.

Weele, 1910, restricted the type-series to the ♂ from Darjeeling, in BMNH and in effect designated it as lectotype.

infumata Newman (***Sialis***), 1838 : 500. Holotype ♀. [Locality and determination label blackened and almost illegible], Sialis Latr., infumata Newm., [North America, Trenton Falls (Doubleday)] Ent. Club / Sialis infumata Newm., ♀ Holotype, D. E. Kimmins det. 1969.

Left hind wing missing, part of left fore wing mounted dry, abdomen in canada balsam.

intimus McLachlan (***Neuromus***), 1869 : 44–45. LECTOTYPE ♂. Ind[ia] / Saunders [Coll.] / intimus McL. type [W. F. Kirby's writing] / Neuromus intimus McL., ♂ Lectotype, D. E. Kimmins det. 1969.

McLachlan stated that the type locality was 'India orientali', but this appears to be an error, as the two syntypes are labelled 'Ind[ia]' and 'Saunders [Coll.]'. Weele (1910 : 29) is also wrong in stating that the 'type was labelled "East Indies" ', although he correctly quotes the other syntype as 'India (Collection Saunders)'. Had he quoted the type-data correctly, I would have accepted his statement as a lectotype designation.

japonicus McLachlan (***Chauliodes***), 1867 : 232. Holotype ♀. Japan / Chauliodes japonicus McL. (Type).

Currently placed in *Parachauliodes*.

kimminsi Aspöck (***Raphidia***), 1964 : 62; 1965 : 315–317, fig. 2. Holotype ♂. Turkey, Amasya, 1400 ft, 9.vi.1959 (*K. M. Guichard*) / Raphidia kimminsi H. & U. Aspöck, 1964, Holotypus ♂.

koreanus Weele (***Neochauliodes***), 1909 : 261; Kimmins, 1954 : 437–438, fig. 16 [Lectotype designation, as 'holotype']. Lectotype ♂. Korea, Seoul, viii (*E. Scarlett*) / Neochauliodes koreanus Weele, type / Abdomen in slide cabinet / Neochauliodes koreanus Weele, ♂ Lectotype, D. E. Kimmins det. 1969.

I regard my designation of '♂ holotype' as equivalent to lectotype.

latratus McLachlan (***Neuromus***), 1869 : 43–44. Holotype ♂. E[ast] Ind[ies] / latratus, McL. type [W. F. Kirby's writing].

Although labelled 'East Indies', our museum register states that most of this collection was from India. Currently placed in *Neoneuromus*.

londinensis Stephens (***Raphidia***), 1836 : 130. LECTOTYPE ♀. Stephens Coll. / Raphidia londinensis Steph., Lectotype ♀, D. E. Kimmins det. 1969.

Currently placed as a synonym of *Raphidia* (*Raphidilla*) *xanthostigma* Schummel.

longicornis Albarda (***Inocellia***), 1891 : 169–170, pl. 11, fig. 32. Holotype ♂. Type [McL. label] / 58 / California (*Walsingham*) / Longicornis Alb. / Inocellia longicornis Alb., ♂ Type, D. E. Kimmins det. 1969.

maclachlani Albarda (***Inocellia***), 1891 : 162–164, pl. 10, fig. 29. LECTOTYPE ♂. [Corsica], Porto Vecchio / 100 / Inocellia mclachlani Alb., det. H. Albarda / Inocellia maclachlani Alb., ♂ Lectotype, D. E. Kimmins det. 1969.

Abdomen of lectotype cleared and preserved in glycerine. There are 1 ♂, 2 ♀ paralectotypes in BMNH, the females being from Sardinia. Currently placed in the genus *Fibla*.

maculicollis Stephens (***Raphidia***), 1836 : 131. LECTOTYPE ♀. Stephens Coll. / maculicollis / Raphidia maculicollis Steph., ♀ Lectotype, D. E. Kimmins det. 1969.

There is a second example ♀, also labelled *maculicollis*. Currently placed as *Raphidia* (*Atlantoraphidia*) *maculicollis* Stephens.

maculifera Walker (***Hermes***), 1853 : 203. Holotype ♀. Walker type label / Malabar, [with on reverse] 'Ent. Club' / H. maculifera, Malabar / Hermes maculifera Walker, ♀ Holotype, D. E. Kimmins det. 1969.

maculipennis Gray (***Hermes***), in Griffiths *et al.*, 1832 : 331. Holotype ♂. H. maculipennis (ruficollis Ramb.), Java.

According to the BMNH Register, this specimen was purchased in 1840, at Mr Children's sale.

megacephala Stephens (***Raphidia***), 1836 : 130. LECTOTYPE ♀. Stephens Coll. / megacephala / Raphidia megacephala Stephens, ♀ Lectotype, D. E. Kimmins det. 1969.

The head and prothorax of this example had become detached and wrongly gummed on to the metathorax of a specimen labelled 'Londinensis', with which it was an obvious misfit. Currently placed as a synonym of *Raphidia* (*Navasana*) *notata* Fabricius. A second example, labelled 'megacephala', is *R. cognata*.

montanus McLachlan (***Neuromus***), 1869 : 42; Kimmins, 1949 : 780–781, fig. 23. Holotype ♀. Sikkim, Lacken, 9000 ft, / N. Ind[ia] / Neuromus montanus McL.

The type has badly battered wings; abdomen cleared and mounted in canada balsam.

nigricollis Albarda (***Raphidia***), 1891 : 142–144, pl. 8, fig. 22. LECTOTYPE ♂. Frankf[urt] a[m] M[ain] / 58 / Raphidia nigricollis Alb., det. H. Albarda / Raphidia nigricollis Albarda, ♂ Lectotype, D. E. Kimmins det. 1969.

In addition, there are 2 ♂ and 3 ♀ paralectotypes in BMNH. Currently placed in *Raphidia* (*Venustoraphidia*).

obscurus Weele (***Neochauliodes***), 1909 : 262–263. Holotype ♀. Pres[ented] by Dr Watts, Manipur / Neochauliodes obscurus Weele, 1908, type.

occidentalis Weele (ssp. ***Neochauliodes sinensis***), 1909 : 266; Kimmins, 1954 : 438–439, figs 17a–c [Lectotype designation (as 'holotype)]. Lectotype ♂. [W. China], Omei-Shan / Neochauliodes sinensis Wlk., occidentalis Weele Type / Abdomen in slide cabinet / Neochauliodes sinensis occidentalis Weele, ♂ Lectotype, D. E. Kimmins det. 1969.

I consider that my designation of a '♂ holotype' in 1954 as equivalent to lectotype.

orientalis McLachlan (***Corydalis***), 1899 : 281–283, pl. 9. Holotype ♂. W. China, Chia-ting-fu, [1000 ft, May] / Corydalis orientalis McL., Type. /

Currently placed in *Acanthacorydalis*.

plomleyi Kimmins (***Archichauliodes***), 1954 : 422–423, fig. 4. Holotype ♂. [Australia, New South Wales], Mt Irvine, [2300 ft], 25.xii.1934 (*N. J. Plomley*) / Abdomen in slide cabinet / Archichauliodes plomleyi Kim., D. E. Kimmins det. 1953.

One pair of wings mounted dry, abdomen in canada balsam.

pontica Albarda (***Raphidia***), 1891 : 102–104, pl. 4, fig. 6. LECTOTYPE ♂. 41 / [Asia Minor, Siwas], Amasia / Raphidia pontica Alb. / Raphidia pontica ♂ Lectotype, D. E. Kimmins det. 1969.

♂ abdomen cleared and preserved in glycerine. Currently placed in the genus *Agulla*. The ♀ paralectotype lacks head and pronotum. Albarda also lists an example without abdomen in the Berlin Museum and two females in Geneva.

pusillus McLachlan (***Chauliodes***), 1867 : 231–232. Holotype ♂. [locality unknown to McLachlan, S. Africa]. Chauliodes pusillus McL. (Type).

Currently placed in *Platychauliodes*.

reedi Kimmins (***Protochauliodes***), 1954 : 440–443, figs 20, 21. Holotype ♂. Chili (*Reed*) / Abdomen in slide cabinet / Protochauliodes reedi Kim., ♂, D. E. Kimmins det. 1953.

One pair of wings mounted dry, abdomen in canada balsam.

[***selysi*** Weele (***Hermes***), 1909 : 256; 1910 : 89.

The BMNH has one example (lacking abdomen), which is labelled 'Type' by Weele, but in 1910 : 89 he indicates (by an asterisk in the specific list) that the 'type' [strictly lectotype] is in the Selys Collection. This is the damaged ♂ from Sylhet. Our example is therefore a paralectotype.]

sibirica McLachlan (***Sialis***), 1872 : 55–56, pl. 1, figs 10, 10a. LECTOTYPE ♂. Type [McL. label] / Sibér[ie] Orient. (*Maack*) / Sialis sibirica McL. / Sialis sibirica McL., ♂ Lectotype, D. E. Kimmins det. 1969.

There are two ♂ and three ♀ paralectotypes.

simplex Walker (***Chauliodes***), 1853 : 200. LECTOTYPE ♂. Walker type label / Silhet [Mr Argent's collection] / simplex / Chauliodes simplex Walker, ♂ Lectotype, D. E. Kimmins det. 1969.

One of the two paralectotypes, which carries Weele's determination label, was the specimen figured by him in 1909 and by Kimmins, 1954 : 433, figs 13a–c.

sinensis Walker (***Chauliodes***), 1853 : 199. LECTOTYPE ♂. North China / C. Sinensis, China / Abdomen in slide cabinet / Chauliodes sinensis Walker, ♂ Lectotype, D. E. Kimmins det. 1969.

The second example, from China, has not been traced in BMNH.

sinensis Walker (***Hermes***), 1853 : 203. See ***bowringi*** McLachlan (***Chauliodes***).

subfasciatus Westwood (***Chauliodes***), 1848 : 70, pl. 34, fig. 5. LECTOTYPE ♂. Sylhet / Saunders [Coll.] / Chauliodes subfasciatus, West. Cab. or. Ent., pl. 34, fig. 5 / Chauliodes subfasciatus Westwood, ♂ Lectotype, D. E. Kimmins det. 1969.

Both the lectotype and paralectotype males lack abdomens. Currently placed in *Neochauliodes*.

subnubilus Kimmins (***Protohermes***), 1949 : 770–771, figs 5–7. Holotype ♂. Birmah, Ruby Mines / Protohermes subnubilus Kim., ♂ TYPE, det. D. E. Kimmins.

Apex of abdomen mounted in canada balsam.

tenuis McLachlan (***Chauliodes***), 1869 : 38. Holotype ♂. S[outh] Afr[ica], Knysna, / C. tenuis type [W. F. Kirby's writing] / Chauliodes tenuis McL., S. Afr.

The holotype now lacks the right fore wing and the left hind wing. Currently placed in *Platychauliodes*.

tonkinicus Kimmins (***Anachauliodes***), 1954 : 428–429, figs 9, 10. Holotype ♂. Tonkin, Ngai-Tio, 22.iv.1924 (*H. Stevens*) / Abdomen in slide cabinet / Anachauliodes tonkinicus Kim., ♂, D. E. Kimmins det. 1953.

One pair of wings mounted dry, abdomen of holotype ♂ in canada balsam.

truncatus Kimmins (ssp. of ***Neochauliodes sinensis***), 1954 : 440, fig. 19. Holotype ♂. [Assam], Khasis, Shillong, 5000 ft, 15.vi.1928 (*T. Bainbrigge Fletcher*) / Abdomen in slide cabinet / Neochauliodes sinensis truncatus ♂ Kim., D. E. Kimmins det. 1953.

umbratus Kimmins (***Neochauliodes***), 1954 : 436, fig. 15. Holotype ♂. Indo-China (*A. Vuillet*) / Abdomen in slide cabinet / Neochauliodes umbratus Kim., ♂, D. E. Kimmins det. 1953.

uniformis Banks (***Protohermes***), 1931 : 412, figs 19, 20. Holotype ♂. B[ritish] N[orth] Borneo, Mt Kinabalu, Lumu Lumu, 5500 ft, 9.iv.1929 (*H. M. Pendlebury*) / Ex F.M.S. Museums / Protohermes uniformis Bks, type.

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Printed in England by Staples Printers Limited at their Kettering, Northants, establishment

A REVISION OF THE TERMITES OF THE GENUS *MACROTERMES* FROM THE ETHIOPIAN REGION (ISOPTERA : TERMITIDAE)

22 JUL
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BULLETIN OF
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ENTOMOLOGY Vol. 24 No. 9
LONDON : 1970

A REVISION OF THE TERMITES OF THE GENUS *MACROTERMES* FROM THE ETHIOPIAN REGION (ISOPTERA : TERMITIDAE)

22 JUL

BY

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Pp. 363–444 ; 12 *Maps,* 152 *Text-figures*

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THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 24 No. 9
LONDON : 1970

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World List abbreviation
Bull. Br. Mus. nat. Hist. (Ent.).

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TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 24 *July* 1970

Price £2 12s.
(£2·60)

A REVISION OF THE TERMITES OF THE GENUS *MACROTERMES* FROM THE ETHIOPIAN REGION (ISOPTERA : TERMITIDAE)

By J. E. RUELLE

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SYNOPSIS

The genus *Macrotermes*, including the genus *Bellicositermes* of some authors, is revised for the Ethiopian Zoogeographical Region. Of 23 species and 11 forms or varieties found in the literature, the varieties have not been retained ; ten specific names are found to be synonymous and three more are dubious. Since one variety has been given specific status and one species has been split into two, this leaves 12 recognized and redescribed species. *M. ukuzii* and *M. mossambicus* have been given specific status (the latter being a senior synonym of *M. michaelseni*), *M. falciger* is another senior synonym (of *M. goliath*), *M. natalensis* has been split into *M. bellicosus* and *M. natalensis*, *M. subhyalinus* replaces *M. bellicosus*. Keys are given to the species ; notes are provided on their distribution and biology.

INTRODUCTION

AMONG the ten genera of the subfamily Macrotermitinae Kemner (1934), *Macrotermes*, like *Microtermes* and *Odontotermes*, occurs both in the Indo-malayan and the Ethiopian Zoogeographical Regions, the other genera being endemic to the Ethiopian

Region. One of the latter, *Ancistrotermes*, was recently revised (Harris, 1966) ; from the same region, 82 species of *Odontotermes* and 34 of *Microtermes* were recorded (Bouillon & Mathot, 1966). This paper deals with the African *Macrotermes*, which are represented by a very abundant material.

Smeathman (1781) described the first known species of this genus (*Termes bellicosus*). Holmgren (1909, 1910) introduced the name *Macrotermes* as a subgenus of *Termes*. Various generic names were attributed to the Ethiopian *Macrotermes* from 1910 to 1926 (year of Sjöstedt's last revision). The three genera recognized by Sjöstedt, with 22 species altogether, were reduced in Snyder's catalogue (1949) to one (*Macrotermes*), with 23 species. After 1949, two new species were described (*M. angolensis, M. ivorensis*) and two synonymized (*M. convexus, M. jeanneli*).

Type-specimens, i.e. the holotype, lectotype, syntypes, paratypes or paralectotypes, where available, have been studied. One type-collection (*M. ivorensis*) has not been accessible ; three neotypes have been selected : *M. bellicosus, M. subhyalinus* and *M. kibonotensis*, the latter a junior synonym of *M. falciger*. In three cases (*M. niger, M. gratus, M. ituriensis* ; Sjöstedt, 1898, 1900, 1924*a*) the loss of the type-material and the impossibility of selecting a neotype leave the concerned species as *nomina dubia*. The words 'LECTOTYPE' and 'NEOTYPE' in capitals indicate designation in this paper.

MATERIAL

A total of 2,123 nest series from all parts of Africa have been examined, containing each from one to sometimes more than one hundred insects. The study started with the material of the British Museum (Natural History) (B.M.(N.H.)), much of which had been collected by the members of the Termite Research Unit. The following institutions have also been visited :

Musée Royal de l'Afrique Centrale, Tervuren (Terv.) ; American Museum of Natural History, New York (A.M.N.H.) ; Institut Royal des Sciences Naturelles, Bruxelles (I.R.S.N.) ; Basler Museum, Abteilung Entomologie ; Muséum National d'Histoire Naturelle, Paris.

Through the courtesy of specialists and others mentioned in the acknowledgements, types and other specimens have been borrowed from :

Naturhistoriska Riksmuseum, Stockholm (Stockh.) ; Zoologisches Museum, Berlin ; Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg (Hamb.) ; Museum of Zoology, Cambridge ; National Collection of Isoptera, Plant Protection Research Institute, Pretoria (N.C.I.) ; Museu do Dundo, Lunda, Angola (Dundo) ; Lamotte collection, Muséum de Paris (on loan at the A.M.N.H.).

Private collections (M. G. Bingham, J. Deligne, D. H. Kistner, C. Noirot, J. M. Pasteels) and unidentified specimens both from the N.C.I. and from the collections of the Lovanium University, Kinshasa (U.Lov.), where this work has been completed, must also be mentioned here, as totalizing nearly 900 of all the nest series examined.

The abbreviations given in brackets indicate the museum of deposit, when listing material in the text ; if the specimen concerned has not been examined by the author, the museum of deposit is given in brackets. Localities not indexed in the

Times Atlas, vol. IV, or homonymous within the same country (e.g. Katanda, Congo) are specified by their co-ordinates of latitude and longitude.

METHODS

The species involved in this revision have been redescribed and a full set of illustrations has been prepared. Previous descriptions have been translated or quoted whenever the characters involved have been found both useful and clearly expressed ; in such cases they are integrated into the standardized layout that has been adopted throughout this work.

Many characters utilized in earlier descriptions of species have been found unnecessary for this generic revision ; others have proved more variable within one species than was previously thought ; the following have been newly used or found of greater importance than hitherto recognized :

Imago :	density of setae on head capsule
Soldiers :	head profile
	shape of metanotum
	pilosity of gula

The figures have been drawn with the aid of a camera lucida, from ethanol-preserved specimens immersed in ethanol ; three scales are used, each of the two larger being twice the next smaller. The largest scale is used only to illustrate the inner margin of the left mandible in the minor soldiers (Text-figs 18, 19, 90) ; the smallest, for the major soldiers throughout, the major workers (Text-figs 20–22) and the minor soldiers, with the exception of *M. ivorensis* (Text-figs 46, 47) which is on the intermediate scale, as are the imagos. In some cases (e.g. Text-figs 70, 123) the drawings include details of the light marks on the cuticle. Antennal segments have not been illustrated and the setae are usually omitted, except when conspicuously dense.

With regard to the measurements, it should be noted that the length of the pronotum has been taken on the median line in the imagos, on the longest lateral lobe (left or right as the case may be) in the soldiers. The head-width across eyes in the imagos is measured in dorsal view, from the extremes of curvature of the eyes ; in the soldiers it is the greatest width, wherever it occurs. Similarly the depth of the head capsule in the soldiers is taken as the distance in profile view from the postmentum (or the lowest point of curvature of the ventral genae, whichever protrudes most) to the highest point of curvature of the vertex, in a line perpendicular to the longitudinal axis of the head. The length of the fore wing is measured from the suture line to the apical point ; the diameter of the eye is its greatest one ; the length of the ocellus includes its posterior, non-translucent part ; and, when measuring the length of the hind tibia (usually the left one), care was taken to put it at an angle with the femur in order to get the full length of the chitinized sheath. For the abbreviations used and for other specifications (concerning the head length and the length of left mandible in the soldiers), see the keys to species. Finally, as experience has shown that various people using various optical devices may find slightly different values in measuring the same object, the upper and lower ranges of dimensions incorporated in the keys have been checked for possible discrepancies of the kind.

The colour scale adopted in this work ranges from pale yellow to pitch-black, with (reddish yellow, amber, orange-brown, chestnut-brown) or without (brownish yellow, brown, smoky brown, sepia-brown) a red shade.

MACROTERMES Holmgren

Macrotermes Holmgren, 1909 : 193. Type-species by monotypy : *Termes lilljeborgi* (Sjöstedt, 1896).

Termes (*Macrotermes*) (Holmgren) Holmgren, 1910 : 286.

Macrotermes Fuller, 1921 : 17 [return to full generic status].

Bellicositermes Emerson, 1925 : 298. Type-species by original designation : *M. bellicosus* (Smeathman) [as subg., syn. *Macrotermes*, Snyder, 1949 : 208].

Hepilitermes Sjöstedt, 1926 : 79, nom. nov. for *Tumulitermes* Sjöstedt, 1924*a* : 253. Type-species : *Macrotermes schoutedeni* Sjöstedt [syn. *Macrotermes*, Snyder, loc. cit.].

Amplitermes Sjöstedt, 1926 : 81, nom. nov. for *Termes* Holmgren [as subgen.] [syn. *Bellicositermes* Sjöstedt, 1926 : 366].

Bellicositermes Emerson ; Grassé, 1937*a* : 34 [full genus], [syn. *Macrotermes*, Snyder, 1949 : 208].

Imago. Large, width of head across eyes 2·8 to 4·5 mm, length of fore wing 24 to 43 mm ; head oval, postclypeus same colour as, or lighter than, head capsule, barely to distinctly inflated ; fontanelle inconspicuous to distinctly protruding ; distance ocellus ex eye 1/4 to 4/3 of ocellus major diameter ; a subsidiary tooth on the first marginal of the right mandible ; antennae 19-jointed ; pilosity variable, but without microsetae distinct from the longer bristles.

Pronotum trapezoidal, index length/width 0·4 to 0·6.

Wings translucent to smoky brown ; mediana of the anterior wing isolated from the scale onwards ; intersegmental membrane of the abdomen in queens without setae.

(The characters of right mandible, pilosity, and mediana of fore wing are useful in separating *Macrotermes* from *Odontotermes*.)

Soldier. Dimorphic. Head length (without mandibles) of the major soldier 4·0 to 7·7 mm, of the minor 2·05 to 4·77 mm ; labrum widest at or before its middle, with a well-developed hyaline tip (acute to obtuse, sometimes lanceolate, faintly suggesting a trilobed one) ; mandibles swordlike, more or less slender and incurved, but without any conspicuous tooth near the middle of inner margin ; antennae 17 to 18-jointed ; gula narrow, at least twice, often three times longer than wide, sides subparallel to concave.

Pronotum sellate, distinctly bilobed, middle region of front margin more or less deeply incurved, but never with forward projecting spines.

Head capsule in major soldiers rectangular to pear-shaped, the length exceeding the maximum width by 15 to 50% of the latter. Pilosity variable. (Again, no macro- and microsetae.)

Minor soldier : size about half that of major soldier, similar in general appearance, but with mandibles more slender, antennae and legs often proportionately longer. Colour usually lighter.

(The overall size, the ubiquitous dimorphism of the caste with a general similarity between major and minor soldiers, the mandibles, the pronotum and the hyaline tip of the labrum are among the most important of the generic characters of *Macrotermes* soldiers.)

Worker. Dimorphic. Mandibles similar to those of the imagos. Head capsule rounded, width in the major caste 2·05 to 3·50, in the minor 1·33 to 2·41 mm.

Holmgren (1909) first created the genus *Macrotermes* with *Termes lilljeborgi* as type-species by monotypy ; subsequently (1910, 1911) he reduced it to subgeneric status and erroneously designated another species, *M. carbonarius*, as the type-species. In 1912 he listed all Indo-malayan species under this subgenus, while stating that the soldier of *M. gilvus* does not have its head constricted in front like the other *Macrotermes ;* his other subgenus, *Termes*, included *T. bellicosus*, *T. goliath*, *T. michelli*, *T. natalensis* and *T. nigeriensis*.

Fuller (1921) pointed out that the name *Termes* was invalid for this particular genus, and proposed instead the name *Macrotermes*.

Sjöstedt (1926) created the genera *Hepilitermes* and *Amplitermes* in addition to *Macrotermes*. In the same work, however, he acknowledged (p. 366) the priority of the subgenus *Bellicositermes*, created by Emerson (1925).

Emerson (1928), while maintaining *Macrotermes* and *Bellicositermes* as subgenera of *Macrotermes*, expressed his doubts about the value of this subgeneric division. In his later publications as well as in his private communications, he dropped the name *Bellicositermes* altogether.

Grassé (from 1937) and Noirot have maintained a generic division between *Macrotermes* and *Bellicositermes* up to the present day, although they noted (Grassé & Noirot, 1951 : 330) that the Asiatic species did not fit very well in this distinction. In describing *M. angolensis*, Noirot (1955) remarked that the species had some mixed characters.

These authors have not taken into consideration *M. vitrialatus*, a widely variable form including several formerly recognized species as synonyms. This species finally invalidates any attempt to divide the genus into two, because it spans the inter-specific gap postulated by Grassé & Noirot in both its ecology and morphology. It confirms the impression gained from the Asiatic and Indo-malayan species that this is one genus.

Some kind of infra-generic grouping may be valid and useful for descriptive purposes, but it is thought that this should be of an informal kind without nomenclatural status.

DISTRIBUTION

This study being restricted to the Ethiopian species of one genus, the phylogeny of the group is not discussed here. The density of individual species throughout their geographical distribution is another point about which no definite, let alone quantitative, conclusions can be drawn, since a few countries only have been systematically searched. With these restrictions, the following may be noted :

Macrotermes has been collected over the whole of the Ethiopian Region, in a variety of habitats from rain forests to subarid zones bordering either the Sahara or the Kalahari deserts. It extends north-east to Southern Arabia, but records from Madagascar, already considered as doubtful by Emerson (1928 : 445), have not been confirmed.

The forest species : *M. ivorensis*, *M. lilljeborgi*, *M. muelleri*, *M. nobilis* (Emerson, 1928 : 441 ; Grassé & Noirot, 1951 : 309), seem indeed restricted to sheltered habitats, although they are not strictly confined to the lowland coastal or equatorial zones. *M. muelleri* does occur in many a riverine or secondary, low-canopied forest of minor area in the Congo basin, as illustrated by Weidner (1961 : 34) from Dundo, Angola. (Incidentally, no forest *Macrotermes* have been recorded south of this latter locality.)

The most widely distributed species, after the splitting of *M. natalensis*, is *M. subhyalinus* (formerly *M. bellicosus*). This species tolerates drier conditions than does *M. bellicosus*, as Grassé & Noirot (1961 : 325) have already stated. The same authors, however, make it clear (loc. cit. and Pl. XV) that *M. subhyalinus* can thrive in the equatorial forest.

M. bellicosus tolerates relatively dry conditions in West Africa, being found from the forest edge to the Sahel savanna (800–400 mm annual rainfall). Its abundance from Senegal to Uganda and in the Congo basin makes it hard to explain its absence from further south, although it should be noted that specimens from Congo forest clearings are larger than those from Northern Nigeria, suggesting a more favourable environment in the sub-climatic zones with abundant rains.

M. falciger, which ranges mainly in eastern and southern Africa, seems to have somewhat higher humidity requirements than *M. mossambicus* and *M. natalensis*. From the extensive collections made by the Plant Protection Research Institute of Pretoria, it appears that the two latter species, together with *M. subhyalinus*, are living in many places in South-West Africa where no *M. falciger* has been recorded.

Little can be said here of *M. herus* and *M. ukuzii*, in view of their limited distribution. *M. vitrialatus*, through the range of climates under which it has been collected, compares most closely with *M. falciger* but for the fact that it extends farther to the north-west than the latter, while being apparently absent from Tanzania.

Additional notes, together with the distribution maps, will be found under the description of each species, but more data are needed about the nutritional habits of *Macrotermes* before deciding whether and to what extent the presence or absence of some vegetation type regulates the geographical distribution of the individual species. Similarly, their soil requirements, if any, have failed to show up clearly in the course of this revision.

KEYS TO SPECIES

'The increased understanding of the variability of all castes has led to difficulties in constructing suitable keys to species. (..) Some of the species are represented by very small numbers of specimens, and it is anticipated that discovery of new material may necessitate the reassessment of the validity of key characters in these cases.' (Sands, 1965 : 17). This holds true with *Macrotermes*. However, in species where numerous specimens could be examined, it has been found that mean numerical values are worth mentioning in the following keys. The text-figures should also help in appreciating some qualitative characters.

Imagos

1 Head width across eyes (H) more than 3·8 mm 2
– H less than 3·8 6
2 Median length of pronotum (PL) more than half its maximum width (PW) ; fontanellar area depressed, fontanelle protruding 3
– PL less than half of PW ; fontanelle not protruding 4

3 Depressed area horseshoe-shaped ; ocellus ex eye (O–E) not less than $\frac{3}{4}$ of ocellus major diameter (O) ; larger, H, 3·76 to 4·27, mean 3·97 (41 specimens out of 42 measured are wider than 3·8 mm) ; hind tibia (T$_3$), 4·99–5·97, mean 5·58 **falciger** (p. 381)

– Depressed area semicircular ; O–E usually $\frac{2}{5}$ of O ; smaller, H, 3·12–3·96, mean 3·48 (9 specimens out of 145 measured are beyond 3·8 mm) ; T$_3$, 4·18–5·29, mean 4·69 **subhyalinus** (p. 419)

4 Head capsule dark sepia-brown to black, wings smoky ; postclypeus not inflated (Text-figs 67, 68, 92), same colour as head ; (forest species, West and Central Africa) 5

– Head capsule chestnut-brown, wings translucent ; postclypeus inflated (Text-figs 136–138), lighter than head ; (savannah and woodland species, Central and South Africa) . . . . . **vitrialatus** (p. 432)

5 Head and postclypeus proportionately longer (Text-figs 65, 66), third antennal segment longer than first . . . . . **muelleri** (p. 405)

– Head and postclypeus proportionately wider (Text-fig. 91), third antennal segment not longer than first . . . . . **nobilis** (p. 415)

6 O–E more than 0·4 mm, and equal to O ; fontanelle small, not protruding ; (forest species, West Africa) . . . . . **ivorensis** (p. 391)

– O–E less than 0·4 mm and inferior to O ; fontanelle, whether or not in a depression, protruding 7

7 Tibiae not darker than femora and/or postclypeus same colour as head . . . 8

– Tibiae darker than femora, postclypeus lighter than head 9

8 Dark-coloured species ; head capsule sparsely pilose ; eye small, major diameter (E) less than 1·13 ; O–E averaging 0·3 mm . . . . . **herus** (p. 388)

– Chestnut-coloured species ; setae abundant on head capsule ; E, 1·14–1·33, mean 1·20 ; O–E averaging 0·15 . . . . . **mossambicus** (p. 398)

9 Area around fontanelle not depressed ; head pilosity conspicuous ; postclypeus inflated ; eye proportionately large (H/E index usually 2·9) ; O–E about $\frac{1}{4}$ of O ; pronotum distinctly narrower than head capsule ; small, H, 2·84–3·47, mean 3·18 ; (West and Central Africa, Uganda) . . . . . **bellicosus** (p. 374)

– Area around fontanelle depressed ; fontanelle followed anteriorly by a median ridge ; head pilosity variable, rather sparse ; postclypeus less inflated (Text-figs 78, 99, 124 *versus* 4–5) ; H, any value from 2·93 to 3·96. 10

10 Eyes proportionately small, H/E index usually 3·3 ; a few inconspicuous setae on head capsule ; H, 3·03–3·68, mean 3·43 mm . . . . . **natalensis** (p. 410)

– Eyes proportionately larger, H/E index usually 3·0 or less ; pilosity variable ; H in most cases either below 3·2 or above 3·35 mm 11

11 Smaller, H, 2·93–3·32, mean 3·14 ; T$_3$, 3·48–4·58, mean 3·98 ; (South-East Africa) **ukuzii** (p. 428)

– Larger, H, 3·12–3·96, mean 3·48 ; T$_3$, 4·18–5·29, mean 4·69 ; (whole Ethiopian Region) . . . . . **subhyalinus** (p. 419)

MAJOR SOLDIERS

HL : length of head from base to external socket of mandible (in a line parallel to longitudinal axis of body) ; HW : head maximum width ; M : length of left mandible—always measured ventrally—from tip to lower external condyle.

1 M always more than 4·3 mm . . . . . **lilljeborgi** (p. 394)

– M less than 4·3 2

2 Sides of metanotum straight or slightly convex, perpendicular to hind margin (Text-figs 69, 72, 93, 140, 146) 3

– Sides of metanotum distinctly convex, acute or rounded (Text-figs 9, 27, 45, 53, 79, 101, 126) 5

3 Head yellow-brown to reddish brown ; eyespots not very conspicuous ; base of gula not much wider than middle, sides nearly parallel ; margins of pro- and mesonotum not much darker than centre ; (savannah and woodland species, Central and South Africa) . . . . **vitrialatus** (p. 432)

– Head darker ; eyespots conspicuous ; base of gula distinctly wider than middle, sides concave ; margins of pro- and mesonotum conspicuously darker than centre (forest species, Angola, Central and West Africa) 4

4 Median light mark on mesonotum merging with paired light spots near middle of hind margin, or the whole median region of mesonotum lighter than the edges ; head rather pear-shaped ; eyespots small ; M, 3·0–3·6 ; T_3, 4·3–5·6 . **muelleri** (p. 405)

– Median light mark on mesonotum separated by a dark transversal band from paired light spots near hind margin ; head rather trapezoidal, sides straight ; eyespots bigger, diameter about 0·2 mm ; M, 2·6–3·06 ; T_3, 3·9–4·51 . . **nobilis** (p. 415)

5 Head distinctly narrowed in front ; HW more than PW by about 1·4 ; T_3 less than HW by about 0·3 mm ; (forest species, West Africa) . . **ivorensis** (p. 391)

– Head scarcely narrowed in front ; HW more than PW by less than 1·4 ; T_3 less than HW by at least 0·6 mm ; (any region) 6

6 Fontanelle inconspicuous and no ridge or grooves in front of it ; mandibles not upcurved, left one only slightly more incurved than right (Text-figs 8, 11) ; thoracic nota much narrower than head, poorly chitinized, corners acute. **bellicosus** (p. 374)

– Anterior part of head more or less deeply sculptured and/or thoracic nota large, distinctly more chitinized than abdominal nota, sides generally rounded ; mandibles upcurved, at tip or throughout (Text-figs 57, 84), or left one strikingly more incurved than right (Text-figs 28, 56) 7

7 Head conspicuously pilose (Text-figs 31, 32, 129) 8

– Cephalic setae rather sparse (e.g. not more than 20 to 30 setae on gula). . . . 9

8 HW more than 3·7, M more than 2·7 ; (Text-figs 27–30) . . **falciger** (p. 381)

– HW less than 3·7, M below 2·7 ; (Text-figs 125–127) . . . . **ukuzii** (p. 428)

9 Head in plan view rather ovate or horseshoe-shaped, sides convex, moderately converging towards anterior end ; in profile evenly flattened (Text-figs 83, 84) ; fontanelle conspicuous but not followed anteriorly by elevated median ridge ; left mandible evenly incurved and longer than HD (= head depth, incl. gula) ; HL, 4·13–6·21, mean 5·15 ; (South, South-West Africa) . . **natalensis** (p. 410)

– No such combination of characters 10

10 Sides of metanotum angularly convex ; head rectangular, in profile abruptly flattened from fontanelle to base of labrum, with deep grooves diverging forwards and conspicuous median ridge ; tip of left mandible upcurved and incurved enough to point at right angle with main axis ; M less than HD ; HL, 4·26–5·68, mean 5·02 ; (Text-figs 56, 60) ; (South-West and South Africa) **mossambicus** (p. 398)

– Sides of metanotum rounded ; left mandible evenly incurved and/or HL more than 5·8 ; (Text-figs 40, 104, 105) 11

11 Head dark brown, mandibles black throughout ; smaller, HL, 4·93–6·10, mean 5·44 ; (North-East Africa) . . . . **herus** (p. 388)

– Head reddish yellow to chestnut-brown, mandibles usually with lighter base ; larger, HL, 4·84–7·70, mean 6·49 (in 435 specimens out of 456 measured, HL is more than 5·60 mm) ; (whole Ethiopian Region). . . . **subhyalinus** (p. 419)

MINOR SOLDIERS

Minor soldiers are less characteristic. The key therefore will identify the majority of specimens but cannot be completely reliable owing to variation.

1 T_3 more than 3·0 mm 2

– T_3 less than 3·0 mm 9

2 T_3/HW index less than 1·7 3

– T_3/HW index more than 1·7 5

3 Maximum width of gula less than 0·8 mm ; HL, 2·20–3·25, mean 2·62 ; mandibles straight, tip slightly curvate (Text-figs 147–152) ; (savannah and woodland species, Central and South Africa) . . . . . . ***vitrialatus*** (p. 432)
– Maximum width of gula 0·8–1·04 mm 4

4 Left mandible evenly incurved, curvature equal to or greater than 90° ; larger, HL, 3·04–4·77, mean 3·79 ; T_3, 2·57–3·87, mean 3·21 ; (Text-fig. 37) ***falciger*** (p. 381)
– Only tip of left mandible distinctly incurved, total curvature inferior to 90° ; smaller, HL, 2·67–4·45, mean 3·57 ; T_3, 2·19–3·35, mean 2·78 ; (Text-fig. 116) ***subhyalinus*** (p. 419)

5 M less than 2·2 7
– M more than 2·2 6

6 M, 2·22–2·99, mean 2·47 ; distinctly wider than right mandible ; front margin of pronotum deeply emarginate ; HL, 2·83–3·82, mean 3·11 ; (Text-fig. 49) ; (West and Central Africa) . . . . ***lilljeborgi*** (p. 394)
– M, 1·64–2·57, mean 1·82 ; not wider than right mandible ; front margin of pronotum shallowly emarginate ; HL, 2·32–3·23, mean 2·53 ; (Text-fig. 94) ; (Central Africa) . . . . ***nobilis*** (p. 415)

7 Quite a few bristles on head capsule ; gula in lateral view protruding, and more so in the anterior third (Text-fig. 47) ; general colour reddish brown ; gula L/W index 2·3 . . . . ***ivorensis*** (p. 391)
– Head smooth ; gula in lateral view less protruding and evenly convex (Text-figs 76, 95) 8

8 General colour light to dark reddish brown ; thorax not lighter than head ; gula narrow (L/W index, 2·9) . . . . ***muelleri*** (p. 405)
– General colour sepia-brown ; thorax lighter than head ; gula proportionately wider (L/W index, 2·45) . . . . ***nobilis*** (p. 415)

9 Fontanelle inconspicuous, i.e. opening small, level with head capsule, circular or slit-like 10
– Fontanelle conspicuous, i.e. protruding, wart-like, crateriform, wide open or any similar appearance 11

10 T_3 less than HL ; metanotum not wider than mesonotum ; left mandible stout, width about $\frac{1}{4}$ of length, serrate when viewed from beneath (Text-figs 15–17, 18–19) . . . . ***bellicosus*** (p. 374)
– T_3 more than HL ; metanotum distinctly wider than mesonotum ; left mandible slender, width about $\frac{1}{8}$ of length (Text-figs 147–152) ; T_3, 2·52–3·42, mean 3·00 . . . . ***vitrialatus*** (p. 432)

11 Large, HL usually 3·6–3·8, PW 2·4–2·6 . . ***falciger*** or ***subhyalinus***, see 4
– Medium, HL usually 2·8–3·1, PW more or less 2·0 12
– Small, HL, 2·21–2·63, mean 2·38 ; PW, 1·43–1·66, mean 1·56 ; mandibles almost straight ; (South Africa) . . . . ***ukuzii*** (p. 428)

12 Head uniformly orange-brown ; margins of thoracic nota darker than middle region ; in plan view, head shortly ovate, metanotum distinctly wider than mesonotum (Text-figs 61–64) . . . . ***mossambicus*** (p. 398)
– Head chestnut-brown to smoky brown, paler beneath, more elongate and more distinctly narrowed in front 13

13 Colour generally dark (smoky to dark sepia-brown) ; setae on labrum, thoracic and abdominal tergites with conspicuously lighter area around base ; postero-lateral sides of pronotum rather straight (Text-fig. 44) . . . . . ***herus*** (p. 388)
– Colour generally lighter (yellow to light chestnut-brown) ; setae without conspicuously lighter area at base ; postero-lateral sides of pronotum convex (Text-figs 87–89) . . . . ***natalensis*** (p. 410)

Macrotermes bellicosus (Smeathman)

(Text-figs 1–20 ; Map 1)

Termes bellicosus Smeathman, 1781 : 141. Type-locality : SIERRA LEONE. [Type materia lost.]

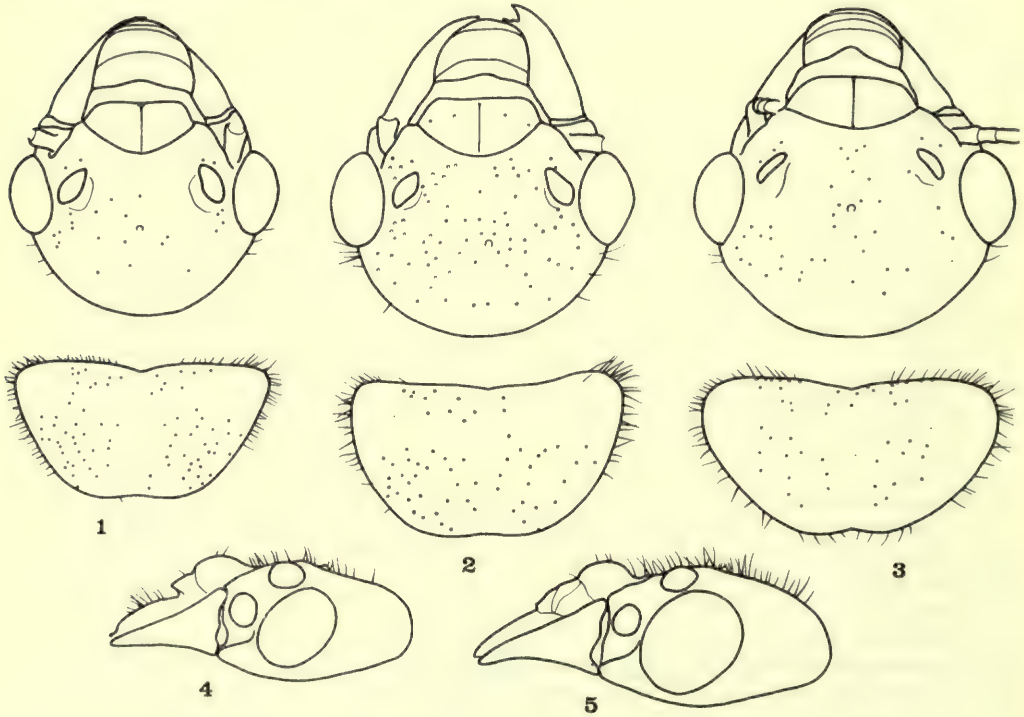
Termes nigeriensis Sjöstedt, 1911*a* : 183. Type-locality : NIGERIA, Yaba, **syn. n.**

Termes carboniceps Sjöstedt, 1924 : 39. Type-locality : CONGO, Yambata, **syn. n.**

Bellicositermes convexus Grassé, 1937*a* : 35 [syn. *M. bellicosus* (as *Bellicositermes natalensis*) Grassé & Noirot, 1961].

Macrotermes bellicosus (Smeathman) Snyder, 1949 : 209 [first use of combination ; misidentification].

The above synonymy contains only entries of nomenclatural significance. Since Hagen (1858) made the first misidentification, Smeathman's name has been wrongly applied to the species now recognized as *M. subhyalinus* and *M. mossambicus*. To correct all the subsequent misidentifications in the synonymy would obscure the nomenclatural entries. It is therefore to be noted that citations of the species-name *natalensis* under the generic headings of *Amplitermes*, *Macrotermes* or *Bellicositermes* in the literature (e.g. Sjöstedt, 1926 ; Emerson, 1928 ; Grassé & Noirot, 1951, 1955, 1958, 1961) and not included in the material examined in this revision, should henceforward be referred to *M. bellicosus*, but only if recorded from the geographical range of this species.



FIGS 1–5. *Macrotermes bellicosus*, imago. 1–3, head capsule and pronotum, plan view ; 4–5, head capsule, side view.

Neotype, major soldier. Head capsule yellowish brown, mandibles black, with reddish base. Gula darker than ventral genae. Pronotum lighter than head ; mesonotum and metanotum lighter still, and similar to the abdominal tergites. Legs yellow, tibiae not darker than femora.

Head in plan view rectangular, sides almost straight, only slightly converging in front. Mandibles not upturned, left one broader and slightly more incurved than right, inner margin viewed from beneath faintly serrate. In profile, head capsule rather flat (opp. *subhyalinus*), upper and lower surfaces parallel, gula not prominent. Antennae 17-jointed, third segment almost twice as long as the second ; fourth and subsequent segments shorter than second ; first and third equal. A few scattered setae on the head capsule, more setae on the gula. Labrum oval ; hyaline tip triangular with almost concave sides.

Pronotum relatively small (opp. *subhyalinus*,) front margin more emarginate than hind margin ; antero-lateral corners more acute than in *subhyalinus*, sides nearly straight. Mesonotum distinctly narrower than pronotum and only slightly narrower than metanotum ; side of mesonotum with obtuse tip. Hind margin of metanotum convex. Thoracic nota less sclerotized than in *subhyalinus*.

Measurements in millimetres : holotype—range and mean of 671 specimens from 131 localities :

	Holotype	Range	Mean
Head length	5·31	4·13–6·30	5·31
Head width	4·40	3·14–5·17	4·16
Head depth inc. gula	2·58	1·96–2·96	2·48
Length of gula	3·61	2·99–4·08	3·54
Maximum width of gula	1·30	0·92–1·33	1·12
Minimum width of gula	0·83	0·70–1·13	0·85
Length of left mandible	2·72	2·16–2·93	2·60
Length of hind tibia	3·47	2·68–4·01	3·40
Maximum length of pronotum	1·47	1·18–1·69	1·46
Maximum width of pronotum	3·13	2·33–3·56	2·99

Minor soldier. Head somewhat paler than that of major soldier. Mandibles dark reddish brown. Thoracic tergites paler than the head, and similar to the abdominal tergites. Head more elongate, mandibles more slender and more symmetrical than in the major soldier. Left mandible distinctly serrate (Text-figs 18–19). Hyaline tip of labrum with convex sides.

Thoracic tergites : pronotum the widest, mesonotum the narrowest ; metanotum, however, not much wider than mesonotum.

Measurements (427 specimens from 106 localities) in millimetres.

	Range	Mean
Head length	2·13–3·42	2·77
Head width	1·77–2·79	2·22
Head depth inc. gula	1·09–1·72	1·37
Length of gula	1·50–2·02	1·75
Maximum width of gula	0·56–0·75	0·65
Length of left mandible	1·43–2·15	1·77
Length of hind tibia	1·77–2·63	2·25
Maximum length of pronotum	0·79–1·23	0·94
Maximum width of pronotum	1·43–2·16	1·77

Major worker. Head brownish, lacking the reddish tinge of *subhyalinus* ; posterior margin less rounded than in either *natalensis* or *subhyalinus* (Text-figs 20–22).

Head width (204 specimens from 94 localities) : range 2·04–2·91, mean 2·47 mm.

Morphotype imago. Head dark brown. Postclypeus lighter than head, with dark median line. Thoracic tergites similar in colour to head, pronotum with a lighter T-shaped mark (as in *subhyalinus*). Abdominal tergites dark brown. Wings translucent, smoky.

Head rounded, numerous setae on head and pronotum, with light dots around base. Frons flat, not depressed around fontanelle ; fontanelle conspicuous, on top of a small hump, without any anterior median ridge (opp. *natalensis*). Eyes broadly oval, large, but less rounded than in *subhyalinus* and less inflated than in *mossambicus*. Ocelli nearly circular, not more than about ¼ of their diameter distant from the eyes (½ in *natalensis*). Postclypeus wider and more inflated than in *subhyalinus*. Antennae 19-jointed, third segment longer than second and fourth.

Pronotum with anterior margin flat, posterior broadly indentated ; proportionately wider than in *subhyalinus*.

Measurements in millimetres : morphotype—range and mean of 160 specimens from 56 localities :

	Morphotype	Range	Mean
Head width across eyes	3·07	2·84–3·47	3·18
Eye major diameter	1·07	0·95–1·25	1·11
Ocellus major diameter	0·42	0·34–0·50	0·41
Ocellus minor diameter	0·36	0·20–0·40	0·33
Ocellus ex eye	0·14	0·05–0·27	0·11
Median length of pronotum	1·68	1·36–1·76	1·60
Maximum width of pronotum	2·86	2·57–3·39	3·04
Length of hind tibia	4·50	3·96–5·21	4·64
Length of fore wing (tip-scale)	27·00	24·00–34·00	29·40
Maximum width of fore wing	7·10	6·00–9·00	7·30

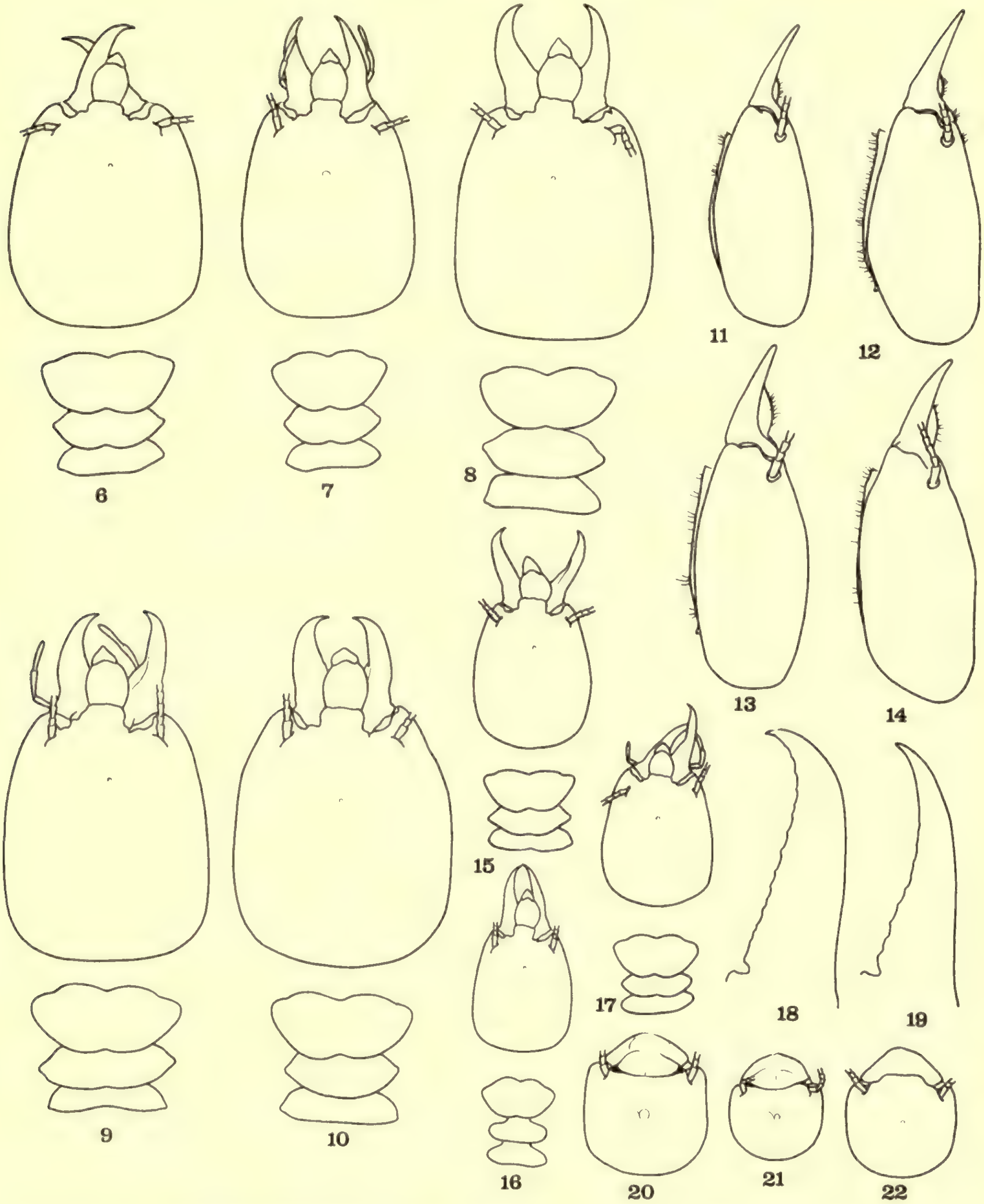
Variation. Lateral expansions of the mesonotum may make it occasionally wider than the metanotum, in the major soldiers. In a sample of 50 specimens from 19 localities, this was the case with 27 specimens. In point of size, the West African specimens are smaller than those from Central Africa, the average difference being 0·2 mm for head width of imago and head length of minor soldier, 0·5 for head length of major soldier, 6·0 for length of fore wing in alates. But the only non-overlapping figures are those of the wing length and this character alone does not seem to warrant a subspecific distinction.

The termites from the oldest collections of the Linnean Society (London) include one unlabelled major soldier of *M. bellicosus* and two minor soldiers, labelled : ' Termes bellicosus milites Smeathman, Termes fatalis L. milites '. These two minor soldiers belong to one species of *Macrotermes*, the specific determination of which could not be ascertained. Since there is neither an indication of locality nor any resemblance of the writing on the labels to Solander's writing, it has been concluded that Smeathman's types are lost. A neotype from Sierra Leone has been selected from the B.M.(N.H.) collections. Although Freetown is nearer to the place where Smeathman had made his observations, a sample from a mature colony at Njala has been chosen, since the material available from Freetown is less satisfactory (immature colonies).

Evidence obtained in the course of this revision has revealed both a morphological and a geographical gap between what used to be called *M. natalensis* in West and Central Africa and the species described by Haviland ; hence the present splitting.

The type imago of *Termes nigeriensis* Sjöstedt could not be found in the Stockholm collections ; the ' topotype ', as labelled by Dr A. E. Emerson (unpublished), and any other samples of ' *M. nigeriensis* ' from the same region are indiscernible from *M. bellicosus*.

Termes carboniceps Sjöstedt, known by the soldier caste only, is a larger than



FIGS 6–22. *Macrotermes*, soldiers, major worker. 6–19. *M. bellicosus.* Major soldier ; 6–10, head capsule and thoracic nota, plan view ; 11–14, head capsule, side view. Minor soldier ; 15–17, head capsule and thoracic nota, plan view ; 18–19, left mandible, inner margin. 20–22. Major worker, head capsule, plan view : 20, *M. bellicosus ;* 21, *M. natalensis* ; 22, *M. subhyalinus.*

average and accidentally blackened sample of *M. bellicosus*. This conclusion was reached after a collecting trip through the type-locality (11.ix. to 2.x.1966).

NEOTYPE. SIERRA LEONE : Njala (Lat. 8°6′ N., Long. 12°5′ W.), 24.viii.1930 (*E. Hargreaves*, Coll. No. 407). Neotype major soldier and other material from same colony in B.M.(N.H.). Morphotype imago. GHANA : Accra, i.1955 (*W. V. Harris*, Coll. No. 887), B.M.(N.H.).

Type Material. Paratypes, type colony, A.M.N.H. (previously determined by Dr A. E. Emerson as *M. natalensis* var. *tumulicola*, with the comment : ' comp. cotype *natalensis* from Natal & believe different variety at least ') : other paratype, N.C.I.

Other Material. PORTUGUESE GUINEA : Bamboya (12° N., 16° W.), I.R.S.N. ; Bissâo 1898 (*H. Ehrhardt*), Stockh. & Hamb., 1901 (*Soller*), Hamb. ; Bula Bulamelo, (12°10′ N., 15°40′ W.), 12.iii.1953 (*J. P. P. Amara*) ; no locality, 1897 (*Schreckenbach*), Hamb.

GUINEA : Conakry, 10.xi.1892 (*Brauns*), Hamb. ; Fouta Djalon (*Pobéguin*), Stockh. ; Kindia, 21.viii.1912 (*F. Silvestri*), A.M.N.H. ; Kissidougou (*Chevalier*), Stockh. ; Nimba Mts, 1941 to 1956, 37 vials (*M. Lamotte*), Lamotte collection.

SIERRA LEONE : Bo, 11.i.1958 and Freetown, 7.i.1958 (*W. Wilkinson*) ; Pujehun, 15.iii.1947 (*F. A. Squire*), A.M.N.H.

LIBERIA : no locality, no date, ' cotype *T. tumulicola* ' (*Benson*), 4.viii.1926 (*J. Bequaert*), Bendija (co-ordinates?), 1940, 4 vials (*W. M. Mann*), A.M.N.H. ; Cape Mount (6°41′ N., 11°20′ W.), no date (*Büttikofer*), Stockh. ; Charlesville (6°15′ N., 10°20′ W.), 10.vi.1962 (*D. H. Kistner*), private collection ; Loffa River, 17.viii.1937 (*H. Schomburgk*), Hamb. ; Monrovia, vii.1926 (*J. Bequaert*), A.M.N.H. ; Zeanschve (6°50′ N., 9°50′ W.), ix.1926 (*J. Bequaert*), Terv. & A.M.N.H.

IVORY COAST : Adiopodoumé (5°20′ N., 4°08′ W.), 7.viii.1953 (*M. Lüscher*), Touba, ' cotype B. *convexus* ', A.M.N.H. ; no locality, 1908 (*Bouet*), Stockh.

GHANA : Accra, ? i., Kumasi, 3.ii.1955 (*W. V. Harris*) ; 10 m. N. of Yeji on Kumasi–Tamale Rd, 25., 11 m. fr. R. Volta on Nyankpala (Tamale) Rd, 28.ii., 35 m. fr. Tamale on Yendi Rd, 4., 29 m. fr. Navrongo on Tumu Rd, 13., 40 m. fr. Tumu on Lawra Rd, 16., 9 m. fr. Lawra on Nandom Rd, 18., 52 m. fr. Wa on Sawla Rd, 20., 19 m. fr. Sawla on Damongo Rd, 21., Ejura, 27., 12 m. fr. Techiman on Wenchi Rd, 29.iii.1959 (*W. A. Sands*).

TOGO : Bismarckburg (8°11′ N., 0°40′ E.), no date (*Büttner*), Stockh. ; Lomé, 14.iii.1902 (*Ed. Burdis*), Hamb.

NIGERIA : Western Region : Yaba nr Lagos, 4.ii.1933, collector unknown, topotype collection of *Termes nigeriensis*, A.M.N.H. Other Material : Ijora (Lagos), no data, Ibadan, 2.iv.1953 (*G. C. Webb*), A.M.N.H. ; Bennin (?Benin City), 1907 (*C. Manger*), Hamb. ; 27 m. S. of Ilorin on Oyo Rd, 4., Olokemeje, 8., Agodi (Ibadan), 10.xii.1957 (*W. A. Sands*) ; 4 m. fr. Asaba on Benin Rd, 7., Obanokoro, 8.i., 4.iii., Lagos, 11.iv.1957 (*W. Wilkinson*) ; 17 m. fr. Lagos on short Ibadan Rd, 1955 (*B. J. MacNulty*).—Eastern Region : Niger delta, 1907 (*C. Manger*), Hamb. ; Onitsha, 1954, 27 m. fr. Onitsha on Owerri Rd, 1955 (*B. J. MacNulty*) ; 47 m. fr. Enugu on Onitsha Rd, 2., 20 m. fr. Enugu on Oturkpo Rd, 5.iii.1958 (*W. A. Sands*) :

Aba, 27.xii.1956, Abonema and Degema, 5.i., Calabar, 24.ii., Ahoada, 30.iv., 40 m. fr. Port Harcourt on Owerri Rd, 19.vi.1957 (*W. Wilkinson*) ; Port Harcourt, 1954, 1957, 3 vials (*W. V. Harris, W. Wilkinson*).—Northern Region : Abuja (*H. Mills*), Vom (9°40′ N., 8°40′ E.), 3.iv.1950 (*G. C. Webb*), A.M.N.H. ; Zaria, 4., Katsina, 19.xi., 33 m. fr. Kaduna on Zungeru Rd, 18., 16 m. fr. Zungeru on Bida Rd, 21., 5 m. fr. R. Kaduna on Mokwa–Bida Rd, 22., 21 and 41 m. fr. Mokwa on Bida Rd, 22., Bida, 2 vials, 23., Diko, 27.xii.1956, 65 m. fr. Jos on Karachan Rd, 8., 16 m. fr. Jos on Bauchi Rd, 11., 25 m. fr. Bauchi on Jos Rd, 19.ii., Kwal nr Miango, 1.iv., 2 m. fr. R. Gongola on Gombe–Dadinkowa Rd, 9., Tula, 10., 22 m. fr. Gombe on Ture Rd, 2 vials, 10., 34 m. fr. Yola on Jalingo Rd, 14., 27 m. fr. Beli on Jalingo Rd, 19.v., 43 m. fr. Maiduguri on Ft Lamy Rd, 3., 30 m. fr. Maiduguri on Bama Rd, 4.vi.1957, 42 m. fr. Gboko on Oturkpo Rd, 26.ii., Lokoja, 8., 22 m. fr. Lokoja on Kabba Rd, 10.iii.1958 (*W. A. Sands*).

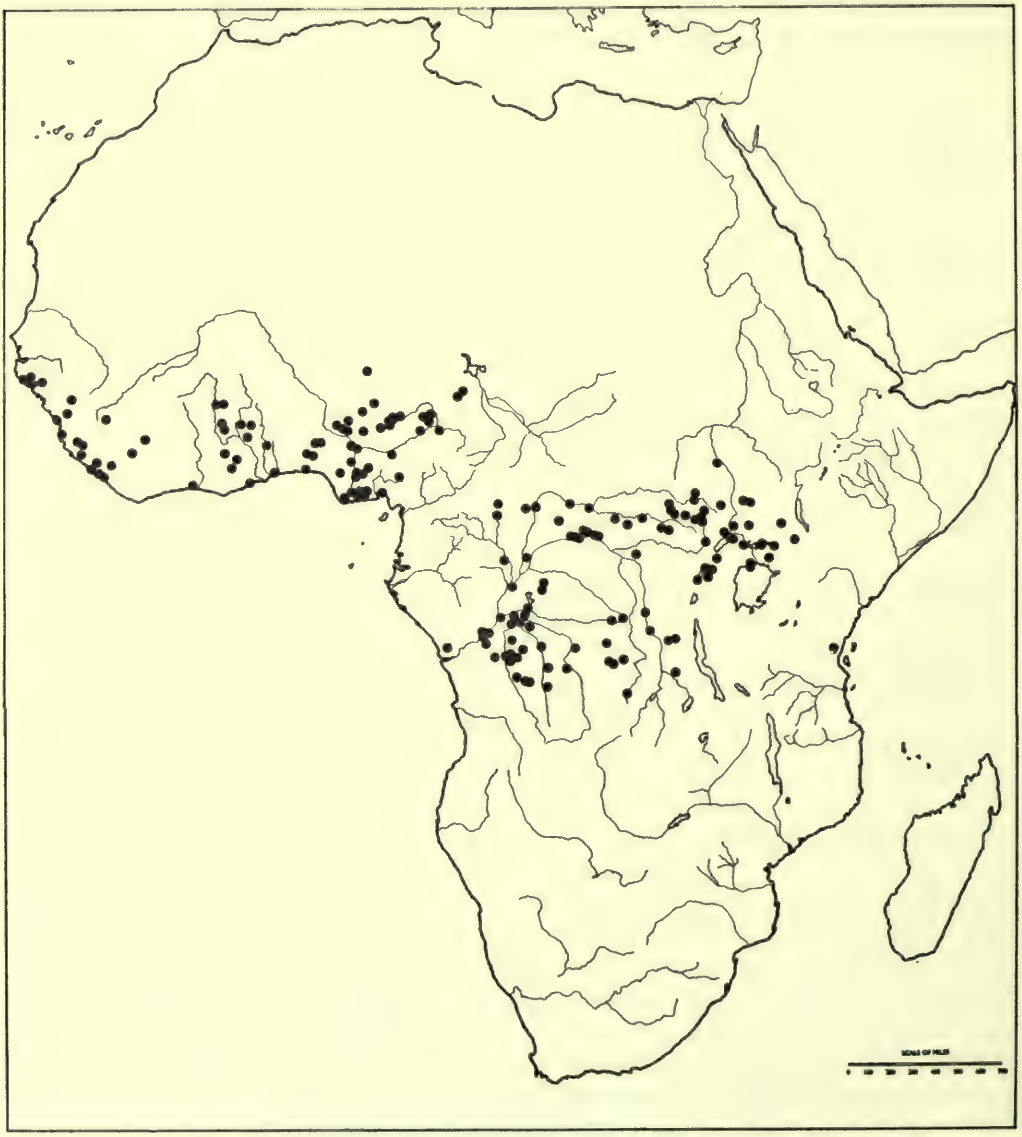
CAMEROON : Mamfe, 27.v.1957 (*W. Wilkinson*).

CENTRAL AFRICAN REPUBLIC : Bania, and Nola (*Eriksson*), Stockh. ; Lobaye (3°40′ N., 18°10′ E.), 1966 (*L. Bouquiaux*), own collection.

CONGO (Brazzaville) ; Matélé (0°31′ N., 16°38′ E.) (*Karlsson*), Ngoko (*Gravot*), Stockh.

CONGO : Yambata, ii.–iii.1914 (*de Giorgi*), type collection of *Termes carboniceps*, Terv. (other syntypes in Stockh. and A.M.N.H.). Other Material : Umangi (*de la Kéthulle, Wilverth, J. E. Ruelle*), Terv., I.R.S.N., Stockh., U.Lov. ; Duma (*Montchal, Schubotz*), Terv., Hamb., Stockh. ; Kisantu, xii.1920, Luebo, viii.1921 (*H. Schouteden*), Terv., A.M.N.H., Stock. ; Bumba (2°10′ N., 22°30′ E.) (*Lootens, Å. Ånberg*), Kabambare, 18, 20.x.1954 (*N. Leleup*), Tshikapa, 25.xi.1921 (*H. Schouteden*), Terv., A.M.N.H. ; Bikoro, 1.iii.1921 (*H. Schouteden*), Dungu (*Hutereau*), Moto (3°02′ N., 29°30′ E.), 1920–1923 (*L. Burgeon*), Nyangwe, 7.i.1911 (*J. Bequaert*), Yakoma (*Bomstein*), Terv., Stockh. ; Kimwenza (4°30′ S., 15°13′ E.), 30.ix.1960, Lisala, 19.ix.1966 (*J. E. Ruelle*), U. Lov., N.C.I. ; Alberta (2°12′ N., 22°26′ E.), xi.1921 (*Tinant*), Bambesa (3°23′ N., 25°47′ E.), 29.xi.1930 (*Vrydagh*), Banzyville, ix.1926 (*Mestdagh*), Bengamisa (*A. Henrion*), Doruma, 1927 (*Walkiers*), Egbunda (2°40′ N., 27°10′ E.), iii.1935 (*Johnen*), Irumu, 2.vii.1914 (*J. Bequaert*), Karawa, 1936–1937 (*Wallin*), Katako-Kombe, 19.i.1908 (*G. Gustin*), Kiambi (7°14′ S., 27°52′ E.), i.1931 (*P. Quarré*), Kindu, 1935 (*Rossignol*), Kondue (4°59′ S., 23°20′ E.) (*E. Luja*), Kotili (2°51′ N., 24°34′ E.), 14.i., Mauda (4°05′ N., 27°41′ E.), 1.iii., Mahagi, 18.v.1925 (*H. Schouteden*), Lakulu (3°28′ N., 23°42′ E.), 1930 (*van den Branden*), Lukolela (1°10′ S., 17°11′ E.), xi.1934 (*Ledoux*), Mpa (3°10′ S., 18° E.) (*J. Maes*), Mukishi (8°31′ S., 24°41′ E.), 25.xi.1927 (*A. Becquet*), Pawa (2°31′ N., 27°40′ E.) (*Claessens*), Tora, 1926, 3 vials (*L. Burgeon*), Van Kerkhovenville (3°21′ N., 29°32′ E.) (*De Greeff*), Witshi-Tadi (3°30′ S., 23°30′ E.), i.1930 (*J. Allaer*), Terv. ; Kabinda (*Müller*), Kangu (5°17′ S., 12°57′ E.), 1932 (*de Schaetzen*), Kinshasa (*Lamarche*), Popokabaka (*J. Mertens*), I.R.S.N. ; Faradje, 1912 and 1948, Niangara, 1913 and 1948 (*Lang-Chapin, N. A. Weber*), Kwamouth, 14.vii.1909 (*Lang-Chapin*), Rwindi Camp (0°47′ S., 29°18′ E.), 6.v., Rifflart (4°25′ S., 15°21′ E.), 9.vi.1948 (*A. E. Emerson*), A.M.N.H.; Tsunza (5°48′ S., 16°28′ E.), Kimvula, 9., Mabaka-Nzadi (6°06′ S., 16°42′ E.), 10., Kitenda (7°01′ S., 17°18′ E.), 12., Suka (7°34′ S., 19°14′ E.), 13., Wamba R. (7°14′

S., 17°43′ E.), Panzi, 14., Kisandji, 15., Kikwit, 18., Inzia R. (5°29′ S., 17°29′ E.), 19., Imbela (5°54′ S., 17°08′ E.), 20., Swa-Kilamba (4°53′ S., 17°08′ E.), 22., Motor-ensiene (3°50′ S., 18° E.), 25., Beno, 25., Gwafumu R. (3°28′ S., 17°35′ E.), 26., Kutumpai (3°45′ S., 17°23′ E.), 28.viii.1959, Katanda (6°23′ S., 23°55′ E.), 23.vii., Mbuji-Mayi (= Bakwanga), 31.vii.1963, Mondongo (2°10′ N., 21°10′ E.), 13,15,29.ix., Yalosemba (2°35′ N., 21°50′ E.), 21.ix.1966 (*J. E. Ruelle*), Kutu, 18,19.viii., Kiri, 3., Pendjua (1°06′ S., 19°05′ E.), 5.ix.1966 (*P. Cappelle*), U. Lov.



MAP 1. Collecting localities of *Macrotermes bellicosus*.

SUDAN : Mt Bangenze, 17.v.1937 (*J. G. Myers*), Imatong Mts, 24.vii.1939, Shambe, vii.–viii.1939 (*N. A. Weber*), A.M.N.H. ; Singi (5° N., 29° E.), 10.vi., Magwe, 4.viii.1962, Wadupe (4° N., 31° E.), 4.i.1960 (*H. Schmutterer*), Hamb.

UGANDA : Southern Buruli, Coll. No. 457, Entebbe, 20.xi.1941, Kazinga Flats (0°40′ S., 30° E.), 1937, Kichwamba, 15.xi.1949 (*W. V. Harris*), Karamoja 40 m. fr. Moroto, 12.x.1952 (*W. A. Sands*), Salalira (1°14′ N., 34°17′ E.), 24.i.1930 (*H. Hargreaves*), B.M.(N.H.) ; Kibuji (Lango), Coll. No. 1, West Nile Region, Coll. No. 6, Bunyoro (Butiaba), Coll. No. 7,14, Katwe, Coll. No. 9, Wasa, Coll. No. 11 (*D. R. Buxton*), Kampala, 9,11.xii., Kinyanga Estate (1°46′ N., 31°33′ E.), 18.xii.1934 (*H. Kirby*), Munyonyi (0°16′ S., 30°14′ E.), ix.1940 (*collector unknown*), Serere, xii.1929 (*P. Chandler*), Teso, xii.1937 (*S. M. Watson*), A.M.N.H.

KENYA : West Suk Distr., 4.x.1952 (*W. A. Sands*) ; Busnia (? Busia), 17.ii.1948 (*N. A. Weber*), A.M.N.H.

TANZANIA : Amani, 25.ix.1934 (*H. Kirby*), A.M.N.H.

ANGOLA : Dundo, v.–viii.1948, 4 vials (*A. de Barros Machado*), (Dundo).

A total of 314 nest series were examined, and all material is in the B.M.(N.H.) unless otherwise indicated.

Neither Dundo nor a few other, not listed above, records from the Ivory Coast (Abidjan, Bingerville, Kouibli, Man) or former French Equatorial Africa (Bossembélé, Makoua) have been substantiated by redetermination and the localities have not been plotted on the distribution map. The determinations, however, are thought reliable (Weidner, 1956 ; Grassé, Grassé & Noirot *passim*), the name ' natalensis ' meaning ' bellicosus '.

The biology and the ecology of *M. bellicosus* have already been extensively studied (Smeathman, 1781 ; Grassé, 1937*a*, 1944 ; Kutter, 1943 ; Grassé & Noirot, 1951, 1955, 1958, 1961 ; Lüscher, 1955, 1956, 1961 ; Ruelle, *in* Bouillon, 1964 : 231, 327 ; Bodot, 1967, 1967*a*). As far as is known, their architecture is the most elaborate of all the *Macrotermes*.

Macrotermes falciger (Gerstäcker) **sp. rev., comb. n.**

(Text-figs 23–37 ; Map 2)

Termes falciger Gerstäcker, 1891 : 186. Type-locality : TANZANIA, Mbusine.

Termes goliath Sjöstedt, 1899*a* : 156. Type-locality : TANZANIA, Kilimandjaro, **syn. n.**

Termes michelli von Rosen, 1912 : 223. Type-locality : CONGO, North Katanga. [syn. *M. falciger* (as *Amplitermes goliath*), Sjöstedt, 1926 : 85.]

Termes swaziae Fuller, 1915 : 462. Type-locality : REPUBLIC OF SOUTH AFRICA, Tzaneen, **syn. n.**

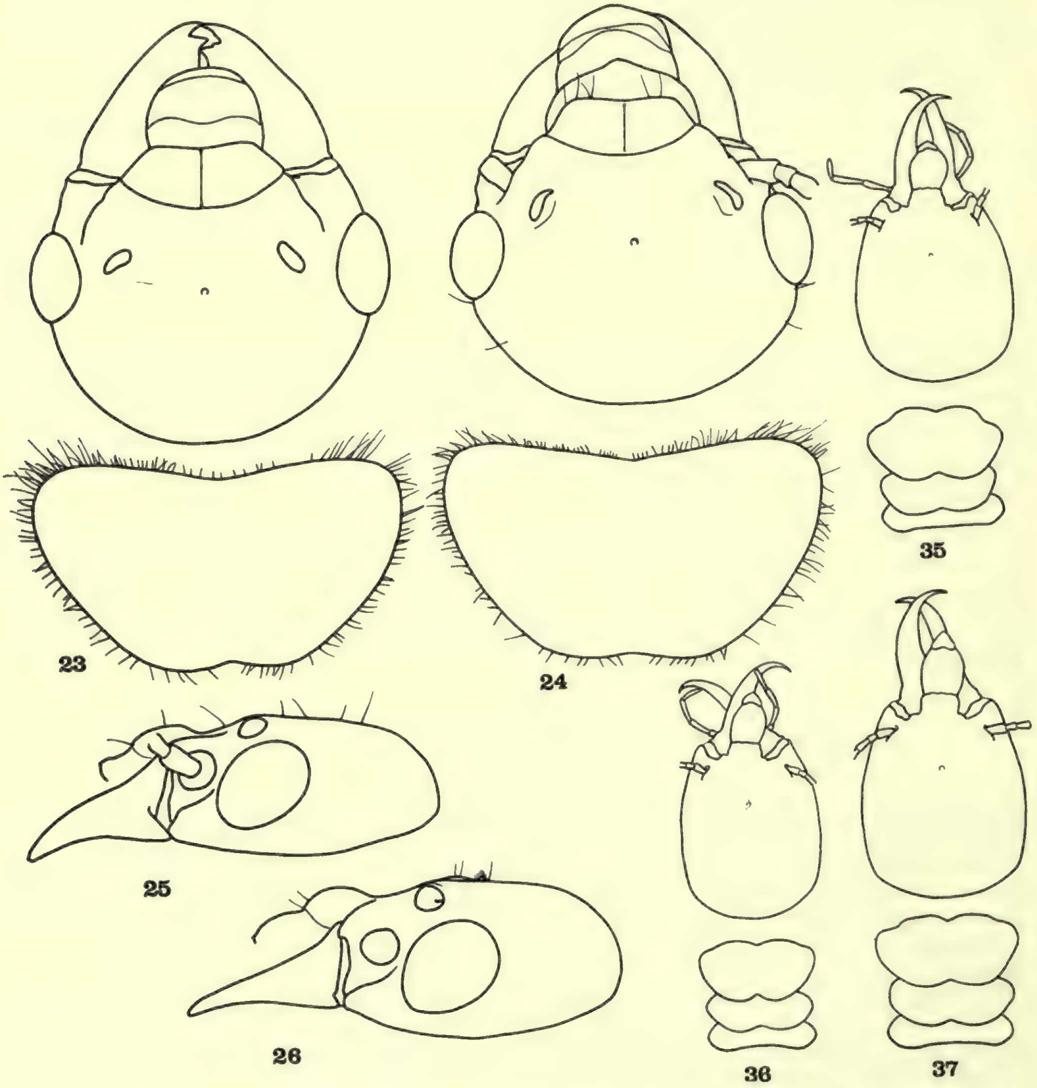
Macrotermes usutu Fuller, 1922 : 79. Type-locality : SWAZILAND, Usutu R., **syn. n.**

Tumulitermes kibonotensis Sjöstedt, 1924*a* : 253. Type-locality : TANZANIA, Kilimandjaro, Kibonoto, **syn. n.**

(Here again, citations of the species-name *goliath*, or misidentifications without nomenclatural significance, such as : Sjöstedt, 1900*a*, 1904, 1907 ; Fuller, 1922 ; Harris, 1958, have been omitted from the synonymy.)

Imago. Head dark chestnut-brown, lighter around fontanelle. Postclypeus same colour as, or slightly lighter than, head. Pronotum darker than head, with T-shaped yellowish mark in the middle, two yellow spots near antero-lateral corners. Tibiae darker than femora. Abdominal tergites darker than sternites. Wings light smoky.

Shape of head capsule in plan view not distinctive ; setae sparse. Fontanellar area depressed, depression in dorsal view horseshoe- or U-shaped ; fontanelle conspicuous, surrounded by short setae, followed anteriorly by a distinct median carina. Eyes proportionately small (H/E index superior to 3·1), not very prominent. Ocelli small, oval, about $\frac{3}{4}$ of their major diameter distant from the eye. Postclypeus relatively narrow, but somewhat inflated. Antennae 19-jointed, third segment equal to fourth plus fifth.



FIGS 23–26, 35–37. *Macrotermes falciger*, imago, minor soldiers. 23–26. Imago : 23–24, head capsule and pronotum, plan view ; 25–26, head capsule, side view. 35–37. Minor soldier : head capsule and thoracic nota, plan view.

Pronotum wider than head across eyes, at the same time long, with front margin shallowly emarginate, posterior flatly incurvate ; antero-lateral corners rounded. Setae more numerous than on head capsule.

Hind tibia long, usually well beyond 5·0 mm.

Measurements (42 specimens from 19 localities) in millimetres :

	Range	Mean
Head width across eyes	3·76–4·27	3·97
Eye major diameter	1·11–1·34	1·23
Ocellus major diameter	0·37–0·48	0·41
Ocellus minor diameter	0·27–0·38	0·32
Ocellus ex eye	0·25–0·45	0·32
Median length of pronotum	1·97–2·27	2·12
Maximum width of pronotum	3·61–4·41	4·01
Length of hind tibia	4·99–5·97	5·58
Length of fore wing	33·00–43·00	38·30
Maximum width of fore wing	8·00–10·20	9·10

Major soldier. Head capsule dark chestnut-brown ; mandibles black throughout. Antennal segments darker than head. Pronotum at times darker than head, meso-, metanotum and abdominal tergites same colour as pronotum ; abdominal sternites lighter. Legs yellow-brown, tarsi not darker than tibiae.

Head in plan view rectangular, without distinctive shape, although usually bigger and wider than in *subhyalinus* ; in profile showing numerous setae on postmentum, frontal area moderately depressed with ' a median, elongate, triangular and transversely wrinkled mound ' (Fuller, 1915 : 463). Mandibles very stout, left one broader and more incurved than right, the latter being just hooked at the tip. Antennae 17-jointed, third segment twice as long as the second, fourth intermediate between third and second. Pilosity of head capsule and postmentum conspicuous. Hyaline tip of labrum with sides straight or even concave.

Thoracic nota very large, strongly chitinized ; pronotum with lateral lobes broadly rounded ; pronotum the widest, mesonotum in most cases wider than metanotum ; hind margin of metanotum not infrequently concave.

Measurements (142 specimens from 64 localities), in millimetres :

	Range	Mean
Head length	5·20–7·43	6·64
Head width	4·00–6·14	5·29
Head depth inc. gula	2·65–3·84	3·28
Length of gula	4·05–4·93	4·45
Maximum width of gula	1·44–1·83	1·60
Minimum width of gula	0·94–1·26	1·09
Length of left mandible	2·85–4·01	3·57
Length of hind tibia	3·10–5·16	4·18
Maximum length of pronotum	1·70–2·61	2·21
Maximum width of pronotum	3·30–5·18	4·35

Minor soldier. Head smoky brown, paler beneath ; mandibles black, with dark sepia-brown base. Antennal segments distinctly darker than head capsule. Thoracic nota and abdomlina tergites same colour as antennae.

Dorsal outline of head capsule trapezoidal, sides convex ; fontanelle slightly protruding, wart-like. Mandibles more slender than in major soldier, left one very evenly incurved, right one hooked, tip of both at 90° or more inwards. Length of hind tibia usually superior to head width.

Sides of thoracic tergites rounded ; mesonotum nearly as wide as metanotum.

Measurements (176 specimens from 65 localities) in millimetres :

	Range	Mean
Head length	3·04–4·77	3·79
Head width	2·59–3·87	3·11
Head depth inc. gula	1·64–2·47	2·03
Length of gula	1·91–3·15	2·40
Maximum width of gula	0·84–1·25	0·93
Length of left mandible	2·23–3·19	2·65
Length of hind tibia	2·57–3·87	3·21
Maximum length of pronotum	1·20–2·10	1·45
Maximum width of pronotum	2·15–3·42	2·61

Major worker. Head dark chestnut-brown, posterior margin rounded ; width (138 specimens from 36 localities) : range 2·64–3·50, mean 2·99 mm.

Variation. This species is generally darker in colour than *M. subhyalinus*, but not always. Neither can one rely on the index mesonotum width/metanotum width or on the concavity of the hind margin of metanotum in major soldiers to separate *M. falciger* from *M. subhyalinus*. Although the evidence is as yet inconclusive, paler specimens and shorter wings seem more frequent in South Africa than elsewhere.

The type-collection of *M. falciger* in the Hamburg Museum had been considered in 1898 by Sjöstedt as *Termes bellicosus* (date of hand-written label found with the sample). The re-determination by the present author was first communicated to Dr H. Weidner and published by him (1966 : 224) as follows : Nach J. E. Ruelle in litt. : *Macrotermes goliath* (Sjöstedt). According to the law of priority, the name '*goliath*' can not be maintained.

Sjöstedt's note (1926 : 85) on *T. michelli* von Rosen has proved right. *T. swaziae* and *M. usutu* Fuller were already regarded as possible synonyms of *M. falciger* by Dr A. E. Emerson (*in litt.*) ; and, indeed, the samples from South Africa are even closer to those from East Africa than the samples of *M. bellicosus* from Nigeria are to those from the Congo. *Tumulitermes kibonotensis* had entirely disappeared from Sjöstedt's work between 1924 and 1926. No type material of this species has been found and it must be presumed lost. A neotype has thus been selected to establish this synonymy.

Type Material. TANZANIA : Mbusine (6°15′ S., 38° E.), 29.viii.1888 (*Fr. Stuhlmann*), minor soldiers, major and minor workers, Hamb. ; other syntypes in Stockh.

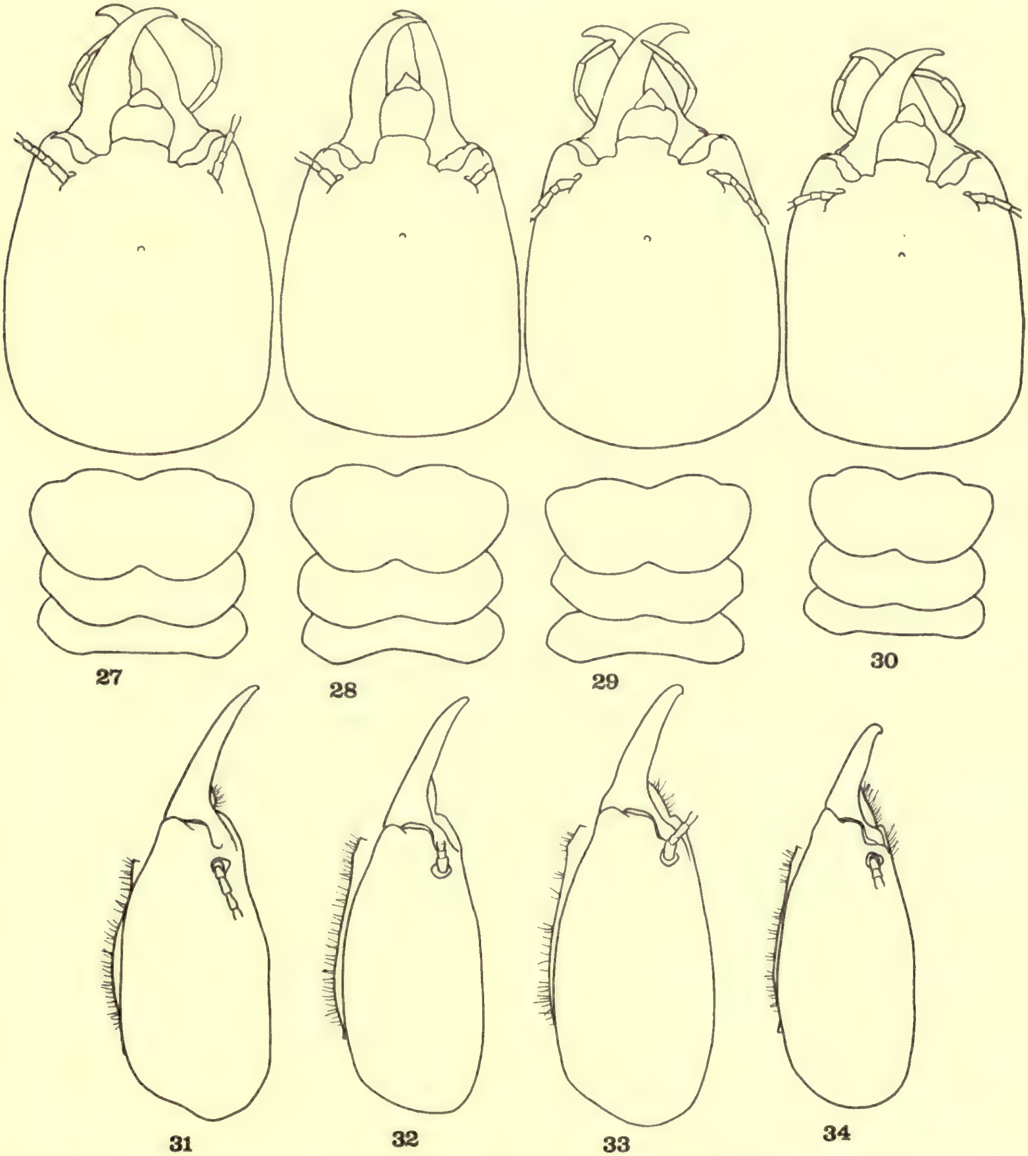
Other Material. CONGO : North Katanga, 1911 (*Michell*), type collection of *T. michelli* von Rosen (Mus. Zool. Staatssammlung, München), paratypes in Stockh. and A.M.N.H.—Lubumbashi (ex-Elisabethville) : 1912, 3 vials (*J. Bequaert*), 1915–1916, 3 vials (*Rimgoet*), 1930 (*Lamoral*), 1948, 5 vials (*A. E. Emerson*), Terv., Stockh., N.C.I., A.M.N.H.—Karibwe R. (9° S., 27° E.), 8–10.iii.1947 (*G. F. de Witte*), (Institut des Parcs Nationaux du Congo et du Rwanda, Bruxelles) and B.M.(N.H.).—Bukama, iv., Kundelungu Mts (9–10° S., 26–27° E.), 19.xii.1911 (*J. Bequaert*), Terv.

UGANDA : Mityana, x.1926 (*H. Hargreaves*), B.M.(N.H.) and A.M.N.H. ; Entebbe, no date (*O. John*).

KENYA : Kwale, 15.vi.1952 (*P. B. Kemp*).

TANZANIA : Kilimandjaro (*T. Paesler*), holotype major soldier of *T. goliath* Sj. ;

paratypes and paramorphotypes, A.M.N.H., (Berlin), Hamb., (Muséum de Paris).—Kibonoto (= Kibongoto), 27.iv.1906 (*Y. Sjöstedt*), NEOTYPE major soldier of *Tumulitermes kibonotensis* Sj., Stockh.—m'Karamo, Massai (? Massai tribe), no date (*Pagani*), Dar-es-Salaam, no date (*Stuhlmann*), Usambara, no dates (*Brunnthaler, Sjöstedt*), Stockh. ; Katesh, 18 & 31.v.1957, 2 vials (*Basilewsky* & *Leleup*), Hamb. and Terv. ; Kisarawe, 1903 (*F. Eichelbaum*), Hamb. ; Tanga, 9.v.1966 (*D. H. Kistner*),



FIGS 27–34. *Macrotermes falciger*, major soldier ; 27–30, head capsule and thoracic nota, plan view ; 31–34, head capsule, side view.

own collection ; Tanga, 19.ix.1924, between Ngare, Nairobi and Longido, 8.xi.1934, Mburu (? Mbulu), 6.i.1935, 45 m. fr. Mbeya tow. Iringa, 12.i.1935 (*H. Kirby*), A.M.N.H. ; Iringa, ii.1937, Arusha, 31.viii.1950 (*W. V. Harris*), Arusha, 27.iv.1961 (*B. Hocking*), Babati, Pienaars Heights, 20.ii.1958 (*collector unknown*).

ZAMBIA : Mufulira, x.1949 (*collector unknown*), Broken Hill–Lusaka, 20.i., Kitwe–Ndola, 21,23,24,25.i., Ndola, 21.30.i., Lusaka, 19.i.1957, Choma, 13,14.i.1957 (*W. G. H. Coaton*), 26.i.1957 (*G. M. Calvert*), 6,9.viii., 10.ix.1959 (*E. N. Cooling*), N.C.I. and U. Lov. ; Lusaka, 22.xii.1966 (*M. G. Bingham*), U. Lov.

MALAWI : Somba (? Zomba), no date (*Cameron*), Stockh. ; Mlanje, 1.viii.1929 (*R. Boulton*), A.M.N.H. ; Shire Highlands (B.M.(N.H.) Acc. No. 1914–291), Cholo, 12.viii., Dedza, 7.ix., Fort Lister Gap (15°49′ S., 35°50′ E.), 21.viii., 23 m. fr. Kasungu on Lilongwe Rd, 18.ix., 10 m. fr. Mzimba on the Rumpi road, 28.ix., Songwe, 1.x. 1953 (*Sands & Wilkinson*), Zomba, 10.viii.1953 (*Sands & Wilkinson*), no date (*H. H. Johnston*).

MOZAMBIQUE : Boane (near Lourenço Marques), no date (*P. C. Joubert*), N.C.I. ; Palma, 12.iv.1914 (*A. Loveridge*).

RHODESIA : Salisbury, no date, 2 vials (*Marshall*), Stockh., iv.1917 (*R. W. Tucker*), 20.vii., 1.viii.1950 (*G. C. Martin*), N.C.I., 19.xii.1949 (*G. H. Bunzli*), B.M.(N.H.) ; Selinde Mt., 13,18.xii.1929 (*R. Boulton*), A.M.N.H. ; Bulawayo, 1903 (*C. P. Lounsbury*), I.R.S.N. ; Concession, 20.v.1922 (*R. Jack*), N.C.I. ; Angwa, x., Matsikite, x., Matopos, 29.xi.1965 (*M. G. Bingham*), U. Lov. ; Mazoe, 14.xi.1917 (*collector unknown*), Gokwe Distr., 20.xi.1962, 2.iii.1964 (*M. G. Bingham*), Rusape, 3.iii., Hartley, 20.v., Trelawney, 3.viii.1949, Norton, 4.vii., 21.viii., Marandellas, 26.x.1950, Melfort, 17.v.1951 (*G. H. Bunzli*).

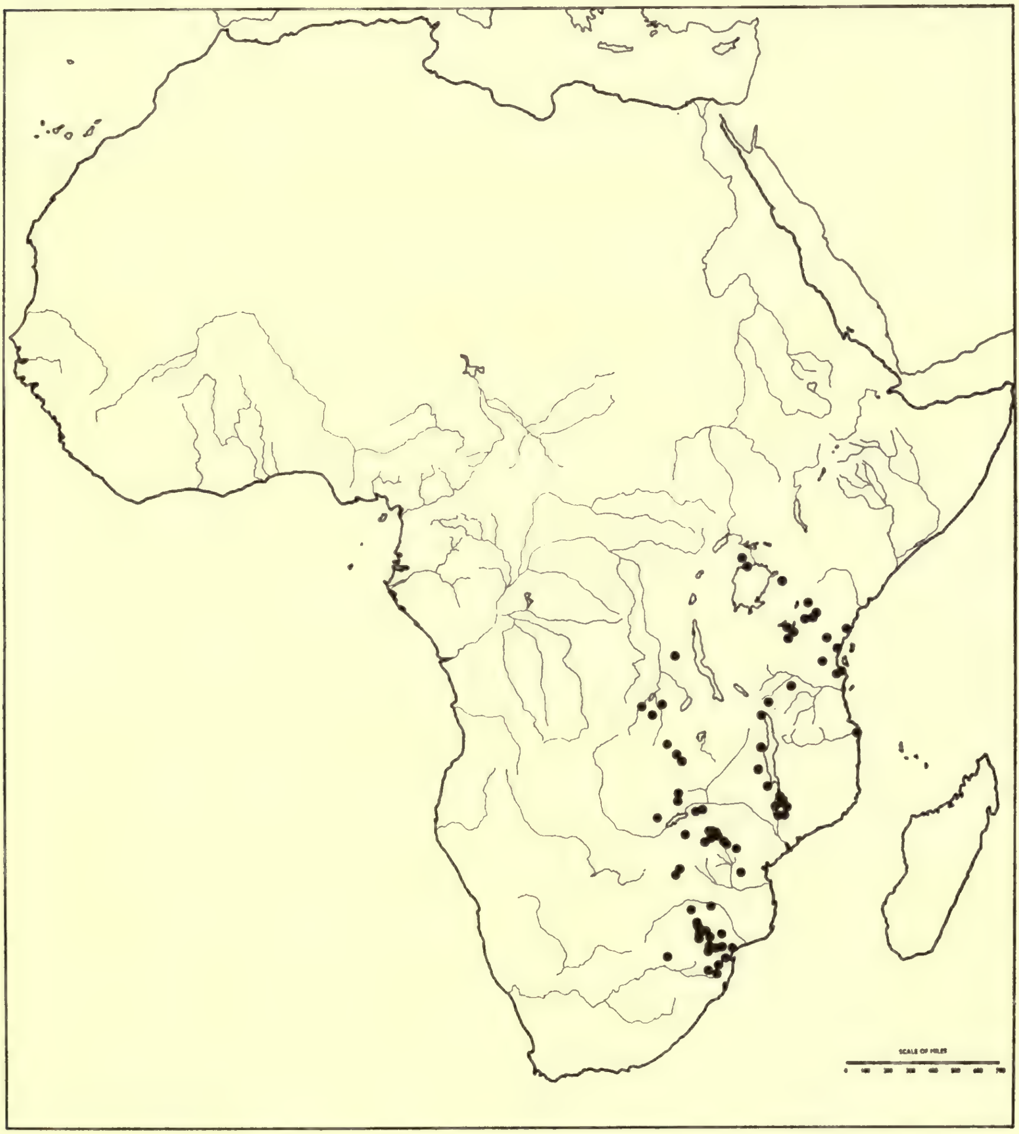
REPUBLIC OF SOUTH AFRICA—(From now on, mention of the material kept in the N.C.I., Pretoria, will for brevity's sake be limited to locality and accession No.)—Type Material of *Termes swaziae* Fuller : several samples of the N.C.I. bear the label ' cotype ', viz. : Tzaneen F-350, also in A.M.N.H., F-351, F-353, also in B.M.(N.H.), F-354 ; Barberton F-352 ; Ledzee F-850 ; Mokeetsi F-853, F-948.—Other Material. Transvaal : Johannesburg, no date (*R. Schwab*), Hamb. ; Acornhoek Rail F-1,538, Bushbuck Ridge TM-1,576, 3,500, 7,597, Duiwelskloof TM-11,340, Gravelotte TM-11,775, Hectorspruit TM-119, Komatipoort TM-5,185, 6,899, Louis Trichardt TM-7,143, Nelspruit TM-5,153, 5,168, 5,173, Ofcalaco TM-13,346, Punda Milia TM-6,764, Satara TM-6,758, Steelpoort F-1,607, The Downs TM-13,349, White River TM-5,151, Mokeetsi F-1,074, TM-115,116,120,199, 13,328, N.C.I. ; Chirinda Mt, 25°23′ S., 32°49′ E., xii.1906 (*D. Odendaal*).

SWAZILAND : Type Material of *M. usutu* Fuller : Hlatikulu, 1920 and vii.1921 (*Pierce*), type colony, N.C.I., syntypes in B.M.(N.H.). Other Material : 39 m. fr. Bremersdorp tow. Gollel, 22.iv.1935 (*H. Kirby*), Hamb. and A.M.N.H. ; Stegi-Bremersdorp TM-6,942, N.C.I.

A total of 177 nest series were examined, and all material is in the B.M.(N.H.) unless otherwise indicated.

M. falciger is predominantly a woodland species. Its typical habitats in Zambia and Rhodesia are the *Brachystegia* woodlands on hillsides and it seems to require very well-drained soils (M. G. Bingham, *in litt.*). The workers occasionally leave their mud galleries to forage in the open, even in broad daylight (Fuller, 1915 : 466 ; Bingham and W. G. H. Coaton, *in litt.*).

This species is not the only *Macrotermes* that can be collected from huge, massive mounds. Specific behaviour (Harris, 1956 ; 1961 : 35 ; Coaton, 1962*a*) is not involved here and the large termite hills, found to contain *M. subhyalinus* (Grassé & Noirot, 1957, 1961), *M. bellicosus*, *Pseudacanthotermes* and other genera (own



MAP 2. Collecting localities of *Macrotermes falciger*.

observation), in various parts of Africa, are, like those of *M. falciger*, the result of a long story of successive recolonizations at the same site. The name ' goliath ' has been misleading.

It is still not clear whether the architectural potential of *M. falciger*, under similar circumstances, differs from that of the partially sympatric *M. subhyalinus*. P. B. Kemp (1955 : 130) found no differences between their nests in North-Eastern Tanzania. Pictures published by Coaton (1962 : 68, 69) suggest that *M. falciger* in Zambia builds low hummocks whereas *M. subhyalinus* erects tall, spired mounds. This, however, was negated by the determination of the insects concerned.

More data are also wanted about the regular presence of a royal chamber. The published evidence is inconclusive, for *M. falciger* (Sjöstedt, 1907*a*, pl. 3 ; opp. Fuller, 1915 : 466) as well as for *M. subhyalinus* (Grassé & Noirot, 1961 : fig. 14 ; opp. Weidner, 1961 : 38). In comparison, *M. bellicosus* regularly builds such a cell ; *M. muelleri* does not.

Finally, the swarming behaviour of *M. falciger* has already been described from Tanzania, Kilimandjaro and Malawi, Somba (? Zomba) by Sjöstedt (1900*a* : 95 ; 1926 : 84). In Zambia, this species emerges just after dark, *M. subhyalinus* around midnight (M. G. Bingham, *in litt.*).

Macrotermes herus (Sjöstedt)

(Text-figs 38–44 ; Map 3)

Termes herus Sjöstedt, 1914*a* : 79. Type-locality : ETHIOPIA, Dire Daua.
Macrotermes herus (Sjöstedt) Snyder, 1949 : 213.

Imago. Head capsule dark reddish brown to black, no lighter area around fontanelle. Postclypeus same colour as head, the median line not darker. Mandibles : base lighter than postclypeus, tip black. Pronotum black, T-shaped dark red mark faintly visible in the middle. Tibiae same colour as femora, abdominal sternites as dark as tergites. Wings smoky brown.

Posterior margin of head capsule nearly semi-circular ; scattered bristles between eyes and ocelli, between ocelli and clypeus. Fontanelle protruding, surrounded by short setae, followed anteriorly by small, rounded longitudinal ridge. Eyes flattened, small (H/E index about 3·3) ; ocelli very small, distant from the eye by at least ¾ of their major diameter. Postclypeus relatively long, not prominent. Antennae 19-jointed, second segment longer than third by about half the latter.

Pronotum not wider than head across eyes ; trapezoidal, front margin straight, sides convex to straight, hind margin barely emarginate. Setae on margins, a few on disc also.

Hind tibia shorter than 4·95 mm.

Measurements (13 specimens from 4 localities) in millimetres.

	Range	Mean
Head width across eyes	3·35–3·77	3·48
Eye major diameter	0·98–1·12	1·04
Ocellus major diameter	0·32–0·46	0·37
Ocellus minor diameter	0·20–0·37	0·28
Ocellus ex eye	0·17–0·37	0·28
Median length of pronotum	1·76–1·87	1·82
Maximum width of pronotum	3·34–3·50	3·43
Length of hind tibia.	4·26–4·95	4·51
Length of fore wing	31·00–35·00	33·50
Maximum width of fore wing	7·20–8·50	8·00

Major soldier. Head capsule dark chestnut-brown ; labrum concolorous with head. Gula darker than ventral genae. Mandibles black throughout. Antennae : first and second segment as head capsule, 3rd to 17th dark brown. Thoracic nota dark brown, lighter in the middle. Abdominal sternites lighter than tergites. Dorsal side of femora light brown ; ventral side and tibiae dark brown.

Head rectangular, sides sub-parallel, faintly converging anteriorly. Fontanelle not very prominent, but wide and relatively far behind anterior end of head capsule (i.e. situated at about 35% of HL), followed anteriorly by a median ridge. Mandibles slightly incurved and upcurved, length of left one about the same value as head depth. Antennae 17-jointed, third segment 50% longer than second. A few scattered bristles on head capsule and postmentum, practically none on thorax.

Pronotum with a transverse as well as a longitudinal axis of symmetry ; mesonotum narrower than pronotum, sides rounded ; metanotum width between those of pro- and mesonotum, hind margin flatly incurvate.

Measurements (50 specimens from 17 localities) in millimetres.

	Range	Mean
Head length	4·93–6·10	5·44
Head width	3·59–4·84	4·24
Head depth inc. gula	2·38–3·22	2·78
Length of gula.	3·56–3·87	3·75
Maximum width of gula	1·30–1·53	1·40
Minimum width of gula	0·86–1·18	1·00
Length of left mandible	2·54–3·06	2·81
Length of hind tibia.	2·86–3·64	3·29
Maximum length of pronotum	1·54–2·02	1·78
Maximum width of pronotum	2·77–3·81	3·34

Minor soldier. Head smoky brown, paler beneath ; gula, however, darker than ventral genae. Mandibles black, base dark brown. Antennae dark sepia-brown. Thoracic nota and abdominal tergites sepia-brown. Abdominal sternites lighter than tergites. Tibiae and tarsi same colour as femora.

Head elongate, sub-trapezoidal, sides straight to slightly convex ; fontanelle conspicuous, followed anteriorly by a faint ridge. Mandibles long, slender, apex incurved. Thoracic nota rather long, sclerotized, sides straight. Hind margins of pro- and mesonotum emarginate, of metanotum straight.

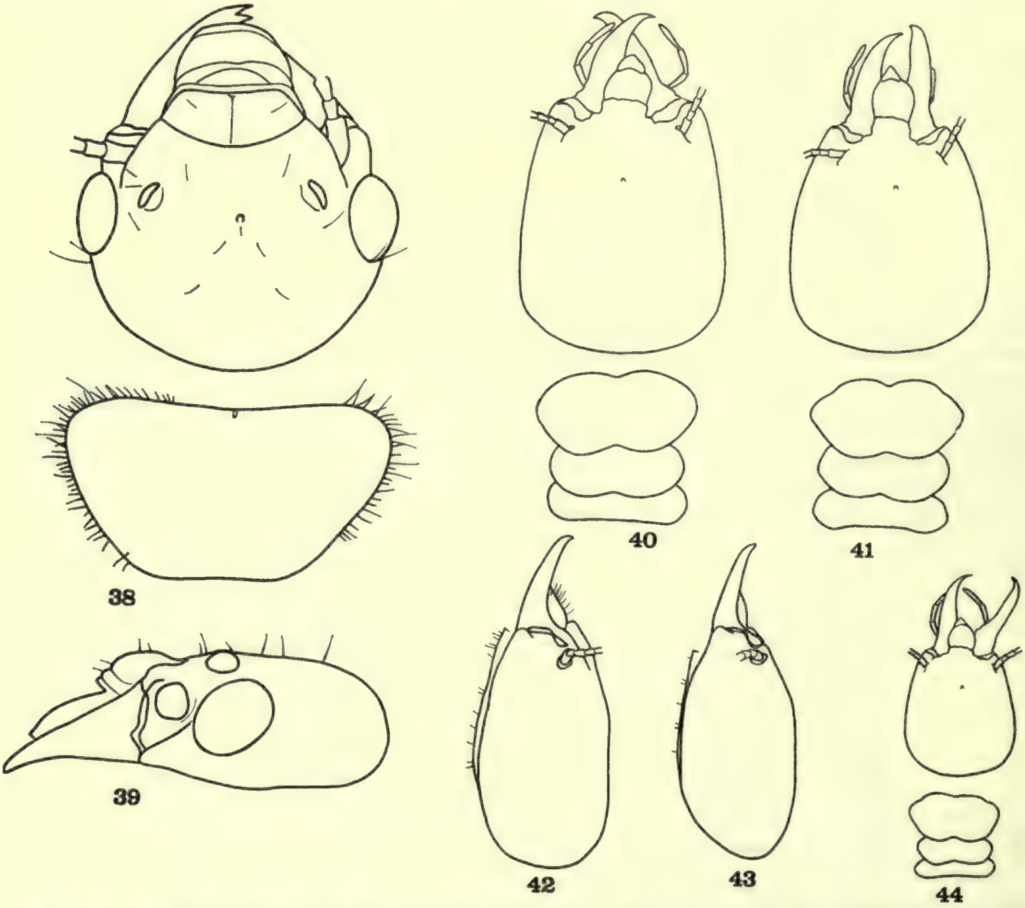
Measurements (56 specimens from 17 localities) in millimetres.

	Range	Mean
Head length	2·47–3·68	3·08
Head width	2·07–3·15	2·56
Head depth inc. gula	1·42–2·11	1·69
Length of gula.	1·89–2·45	2·11
Maximum width of gula	0·78–0·99	0·86
Length of left mandible	1·83–2·37	2·09
Length of hind tibia.	2·07–2·96	2·48
Maximum length of pronotum	1·00–1·40	1·16
Maximum width of pronotum	1·62–2·55	1·98

Major worker. Similar to that of *M. subhyalinus*, but smaller ; head width (47 specimens from 11 localities) : range 2·02–2·75, mean 2·48 mm.

Variation. The darker specimens of this species have been collected at higher altitudes (up to 7,800 ft) in Ethiopia. The backward location of the fontanelle is in fact too variable to provide a specific distinction from the closely similar *M. subhyalinus* major soldiers, but it does suggest a transition between the Ethiopian and the Indo-Malayan *Macrotermes* (of which six species, cursorily examined at the B.M.(N.H.), had their fontanelle at between 38 and 53% of HL ; the highest value found in *M. herus*—and in any Ethiopian *Macrotermes*—being 42).

The specimens listed below, when previously identified at all, had been labelled in the collections examined as '*bellicosus*' (7 samples), '*natalensis*' (4), even '*herus*' (2). This suggests that *M. herus* is very close to *M. subhyalinus* and *M. bellicosus*. However, to say nothing of the dark coloration (because it may simply be correlated with altitude), the eyes and ocelli are definitely smaller and farther apart in *M. herus* imagos than in those of *M. subhyalinus*, and the hind tibiae are also shorter. The difference between soldiers is more a matter of size than of proportions, although the head is somewhat more flattened and the mandibles less incurved in *M. herus* major soldiers than in *M. subhyalinus*. With respect to *M. bellicosus*, the head-depth, the ridge and grooves in front of the fontanelle and the sclerotization of the thoracic nota usually provide a good distinction. While realizing that further research may reduce *M. herus* to a local variant of *M. subhyalinus*, the evidence at



Figs 38–44. *Macrotermes herus*, imago, soldiers. 38–39. Imago ; 38. head capsule and pronotum, plan view ; 39, head capsule, side view. 40–43, Major soldier ; 40–41, head capsule and thoracic nota, plan view ; 42–43, head capsule, side view. 44. Minor soldier, head capsule and thoracic nota, plan view.

present available is insufficient and *M. herus* is therefore considered as a distinct species.

Since the disappearance of the type-specimen (Sjöstedt Acc. No. 303) from the Stockholm collections, another imago from the type-locality had been selected and labelled as lectotype by Dr A. E. Emerson, but the designation has not been published hitherto :

Type Material. ETHIOPIA : Dire Daua, no date (*Hagenbeck*), LECTOTYPE winged female and paralectotypes in Stockholm (Sj. Acc. No. 273), other paralectotype in A.M.N.H. ; 1919 (*A. Marchand*), morphotype major soldier and paramorphotypes in Stockholm (Sj. Acc. No. 282), other paramorphotype in A.M.N.H.

Other Material. NIGERIA : Northern Region : 4 mi. N. of Bida, 23.xii., 26 m. fr. Abuja on Bida Rd, 24.xii., Diko (9°10′ N., 7°06′ E.), 31.xii.1956, 22 m. fr. Gombe on Ture Rd, 10.v.1957, 20 m. fr. Yandev on Makurdi Rd, 25.ii.1958 (*W. A. Sands*).

SUDAN : Tozi (12°40′ N., 33°50′ E.), x.1960, 7 vials (*H. Schmutterer*), Hamb. ; Kaka, no date (*I. Trâgårdh*), Stockh. ; Barakat, 15.ii.1927 (*F. G. S. Whitfield*).

ETHIOPIA : Dire Daua (other than type material), 20.vi.1911 (*E. Wache*), Hamb., no date (*M. Rothschild*), Stockholm, 1961 (*B. G. Hill*), B.M.(N.H.) ; Moulou (coordinates ?), 1901 (*de Zeltner*), I.R.S.N. ; Nazareth (8°34′ N., 39°19′ E.), no date recorded, Bishoftu, 5, 6 & 9.iv. (7 vials), Debrezed (8°50′ N., 38°50′ E.), 6.iv., 100 km S. E. of Addis Ababa, 9.iv.1963, 2 vials (*A. E.* and *El. Emerson*), A.M.N.H.

SOMALI REPUBLIC : Shimba Berris (9°10′ N., 46°08′ E.) (or 10°45′ N., 47°15′ E.), 16.iv.1957 (*E. J. van Ingen*).

KENYA : Nairobi, 9.xi.1950 (*W. V. Harris*).

PEMBA ISLAND : no date, 2 vials (*Pakenham*).

A total of 33 nest series were examined, and all material is in the B.M.(N.H.) unless otherwise indicated.

The biology of *M. herus* is practically unknown. Alates have been collected inside the nest, not far from Addis Ababa, in April.

Macrotermes ivorensis Grassé & Noirot

(Text-figs 45–47 ; Map 4)

Macrotermes ivorensis Grassé & Noirot, 1951 : 333. Type-locality : IVORY COAST, Adiopodoumé (5°20′ N., 4°08′ W.).

Imago. The following notes are translated from the original description (illustrated, op. cit. : 336). Head capsule dark reddish brown ; anteclypeus very pale. Head elongate, sides tapering towards anterior end. Postclypeus small, inflated. Fontanelle small but distinct. Eyes rather large ; ocelli circular and prominent, O–E equal to ocellus diameter. Pronotum moderately sellate, shape almost triangular, anterior margin flat with a very shallow median indentation.

Measurements in millimetres : Head width across eyes, 3·7 ; Eye diameter, 1·0 ; Ocellus diameter, 0·45 ; width of pronotum, 3·52 ; length of hind tibia, 4·4. (The corresponding figures for a male alate from Port Harcourt, Nigeria, are : 3·41, 0·98, 0·41, 3·18 and 4·0 mm. It has not been possible to study the type-queen.)

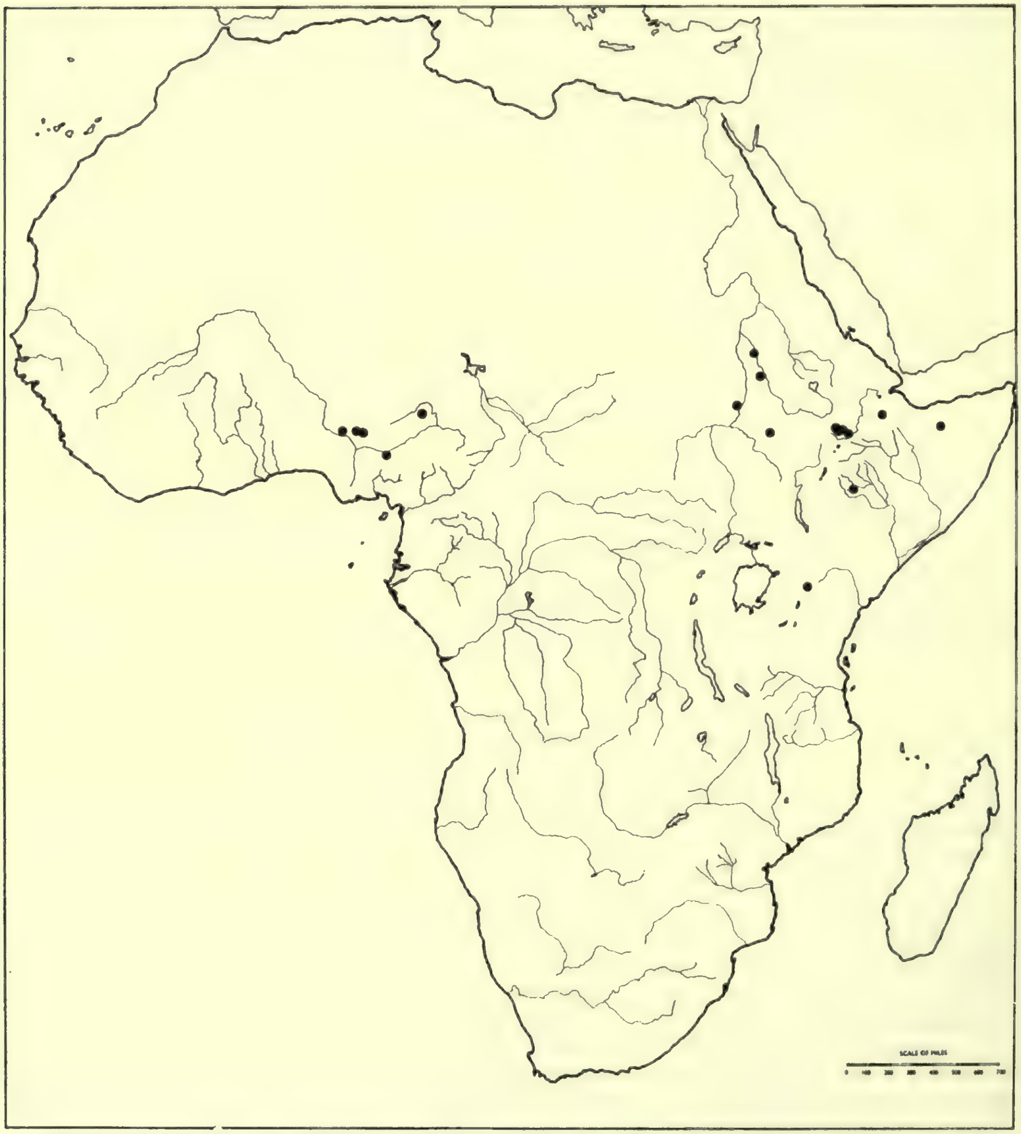
Major soldier. Again translated from Grassé & Noirot, op. cit. : 333. Head capsule reddish.

Mandibles black with reddish base. Labrum reddish, tip hyaline, without setae. Thoracic tergites dark brown, lighter in the middle.

Head in plan view with sides distinctly converging towards anterior end ; posterior angles rounded. Median region of gula considerably narrowed. Mandibles stout, left one thicker than right. Antennae 17-jointed, first and third segment twice the second.

Pronotum trapezoidal, slightly indentated in middle of front and hind margin.

The following measurements (9 specimens from 4 localities ; in millimetres) have been taken in the course of this revision :



MAP 3. Collecting localities of *Macrotermes herus*.

	Range	Mean
Head length	5·09–5·68	5·39
Head width	4·34–4·89	4·63
Head depth inc. gula	2·68–3·12	2·90
Length of left mandible	2·99–3·25	3·12
Length of hind tibia	4·05–4·64	4·33
Maximum length of pronotum	1·64–1·95	1·77
Maximum width of pronotum	2·95–3·55	3·21

Minor soldier. Grassé & Noirot's description : General coloration reddish brown, head more reddish ; thoracic and abdominal tergites brownish ; legs and abdominal sternites lighter.

Head narrowly oval ; fontanelle inconspicuous. Mandibles long and slender, almost straight. Median region of gula not much narrowed. Labrum triangular, elongate, with slightly narrowed base, hyaline tip conspicuous. Antennae 17-jointed, very long, extending backwards beyond hind margin of metanotum by at least three segments.

Pronotum almost hexagonal, lateral angles barely rounded. Legs long and slender.

Measurements (own figures ; 11 specimens from 5 localities) in millimetres :

	Range	Mean
Head length	2·05–2·50	2·21
Head width	1·46–1·86	1·65
Head depth inc. gula	1·18–1·32	1·25
Length of gula (2 specimens)	1·36 & 1·41	—
Maximum width of gula (id.)	0·59 & 0·62	—
Length of left mandible	1·59–1·84	1·68
Length of hind tibia	3·21–3·55	3·35
Maximum length of pronotum	0·91–1·03	0·96
Maximum width of pronotum	1·32–1·59	1·43

The following notes should be added to the original description :

Soldiers. Head capsule definitely more setose than in *M. muelleri* ; major soldiers usually lighter than those of *M. nobilis* ; minor soldiers with a head thicker and less elongate than that of *M. muelleri*, the anterior third of the gula in side view diverging more from the underside of the head capsule, the gula itself being proportionately wider (being also wider than the gula of *M. nobilis* minor soldier).

Major worker. Similar to, but smaller than, those of *M. muelleri* and *M. nobilis ;* head width (17 specimens from 4 localities) : range 2·21–2·67, mean 2·47 mm.

With regard to the figures published by Grassé & Noirot, it will be noted that they extend the upper range of the head length in major soldiers to 6 mm, of the head width in the same to 5·15, and of the hind tibia in minor soldiers to 3·92. As compared with the figures found in the course of this revision, this last result is not too surprising, since another forest *Macrotermes* has yielded precisely the same range for the similar segment in samples from the same locality (*M. muelleri*, mature colonies from Mondongo, Congo : 3·26 to 3·97 mm ; the overall range for this latter species being still larger).

Type Material. Ivory Coast : Adiopodoumé, no date (*Grassé & Noirot*), paratype from type colony, A.M.N.H. (Unpublished evidence indicates that the holotype and morphotype are kept at the " Laboratoire d'Evolution des Etres Organisés, 105, boulevard Raspail, Paris 6ème ".)

Other Material : Yapo Forest Reserve, 24.viii.1953 (*M. Lüscher*), own collection and A.M.N.H. ; Labbé Forest, 30 km N. of Abidjan, 30.iii.1961 (*C. Noirot*), Noirot Coll. No. 675 and B.M.(N.H.).

GUINEA : Nimba Mts, viii.–x.1946, 4 vials (*M. Lamotte*), Lamotte collection.

SIERRA LEONE : Kabui Hills, 7°57′ N., 11°11′ W., 13.i.1958 (*W. Wilkinson*).

NIGERIA : Eastern Region : Port Harcourt, 7–8.vi.1957 (*W. Wilkinson*) ; 12 m. fr. Enugu on Onitsha Rd, 2.iii.1958 (*W. A. Sands*).

A total of 10 nest series were examined, and all material is in the B.M.(N.H.) unless otherwise indicated.

M. ivorensis is a forest species ; a distinct queen cell has been found inside its nest (Grassé & Noirot, 1951 : 317). Swarming in Eastern Nigeria can occur in early June, according to the collecting date of the sample from Port Harcourt.

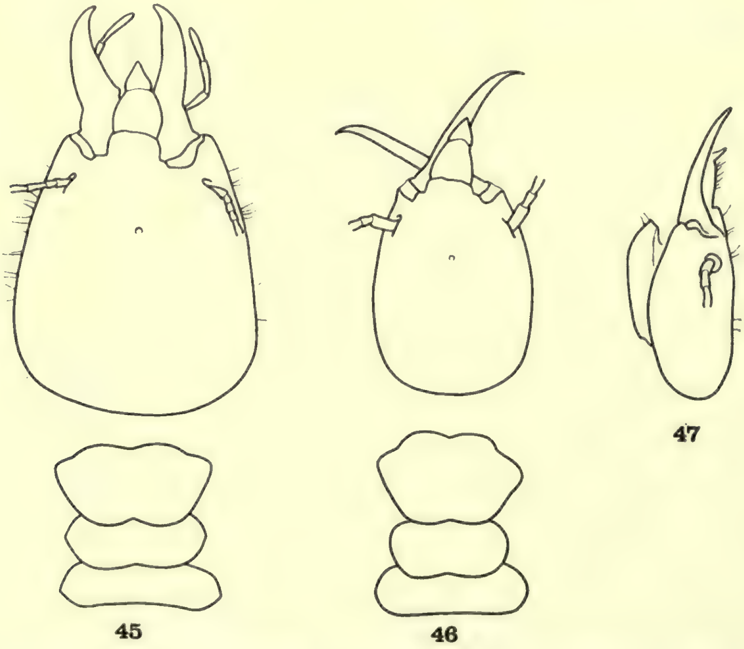
Macrotermes lilljeborgi (Sjöstedt)

(Text-figs 48–50 ; Map 5)

Termes Lilljeborgi Sjöstedt, 1896 : 269. Type locality : CAMEROON, Kitta (4°30′ N., 9°0′ E.).

Imago. Unknown.

Major soldier. Head reddish brown to black. Labrum same colour as head. Gula darker than ventral genae. Mandibles black. Antennae dark chestnut brown, apical segments yellow. Pronotum lighter than head, margins dark. Abdominal tergites darker than the



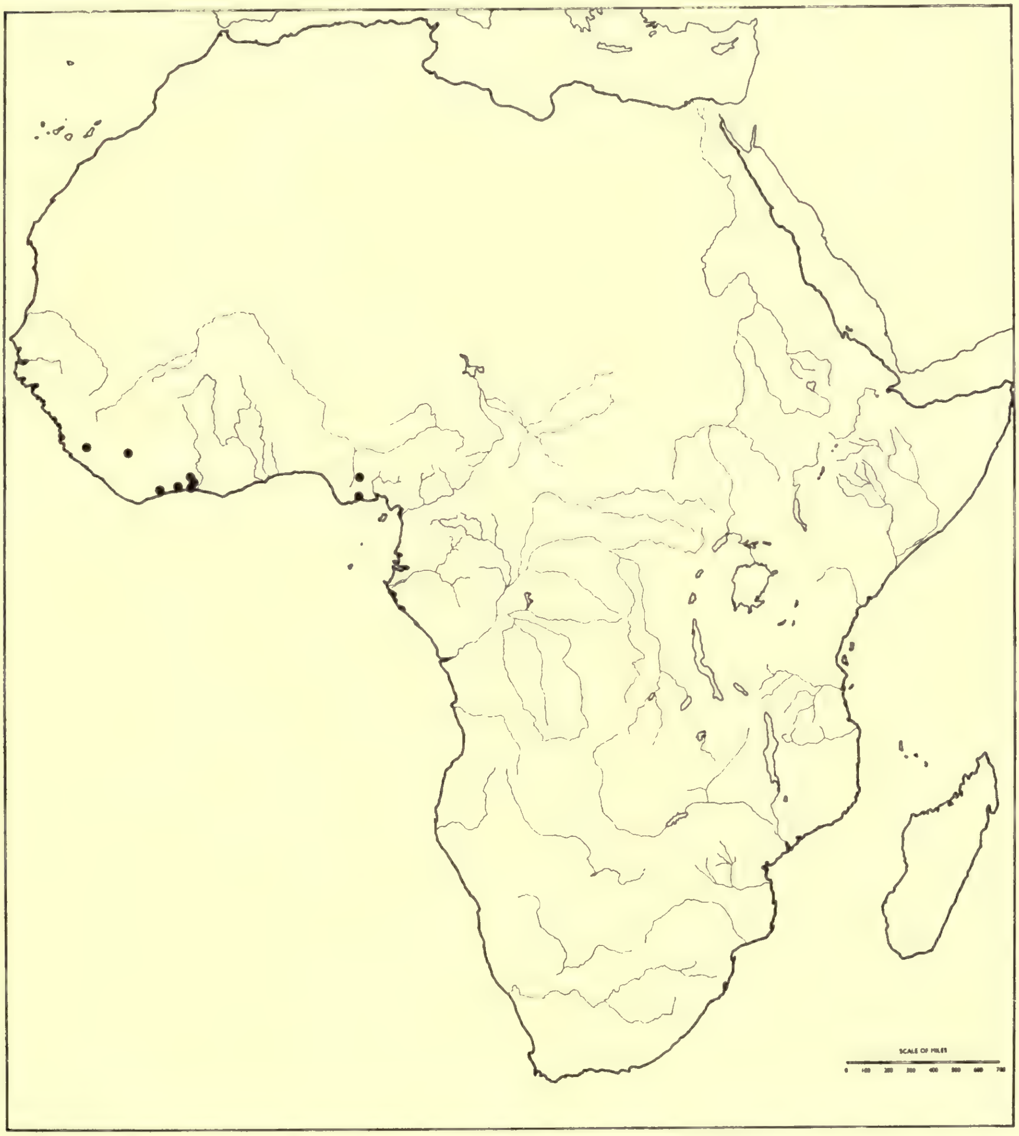
FIGS 45–47. *Macrotermes ivorensis*, soldiers. 45. Major soldier, head capsule and thoracic nota, plan view. 46–47. Minor soldier : 46, head capsule and thoracic nota, plan view ; 47, head capsule, side view.

sternites, but lighter than thoracic nota. Legs pale to brownish yellow ; tibiae and tarsi not darker than femora.

Head capsule conspicuously narrowed in front, in plan view with two shallow grooves diverging from fontanelle to base of clypeus. Mandibles very long, evenly and moderately upcurved, left one wider than right (Emerson's statement to the contrary (1928 : 442) must have been a misprint). Antennae 17-jointed, third segment the longest, more than twice the second. Fontanelle inconspicuous.

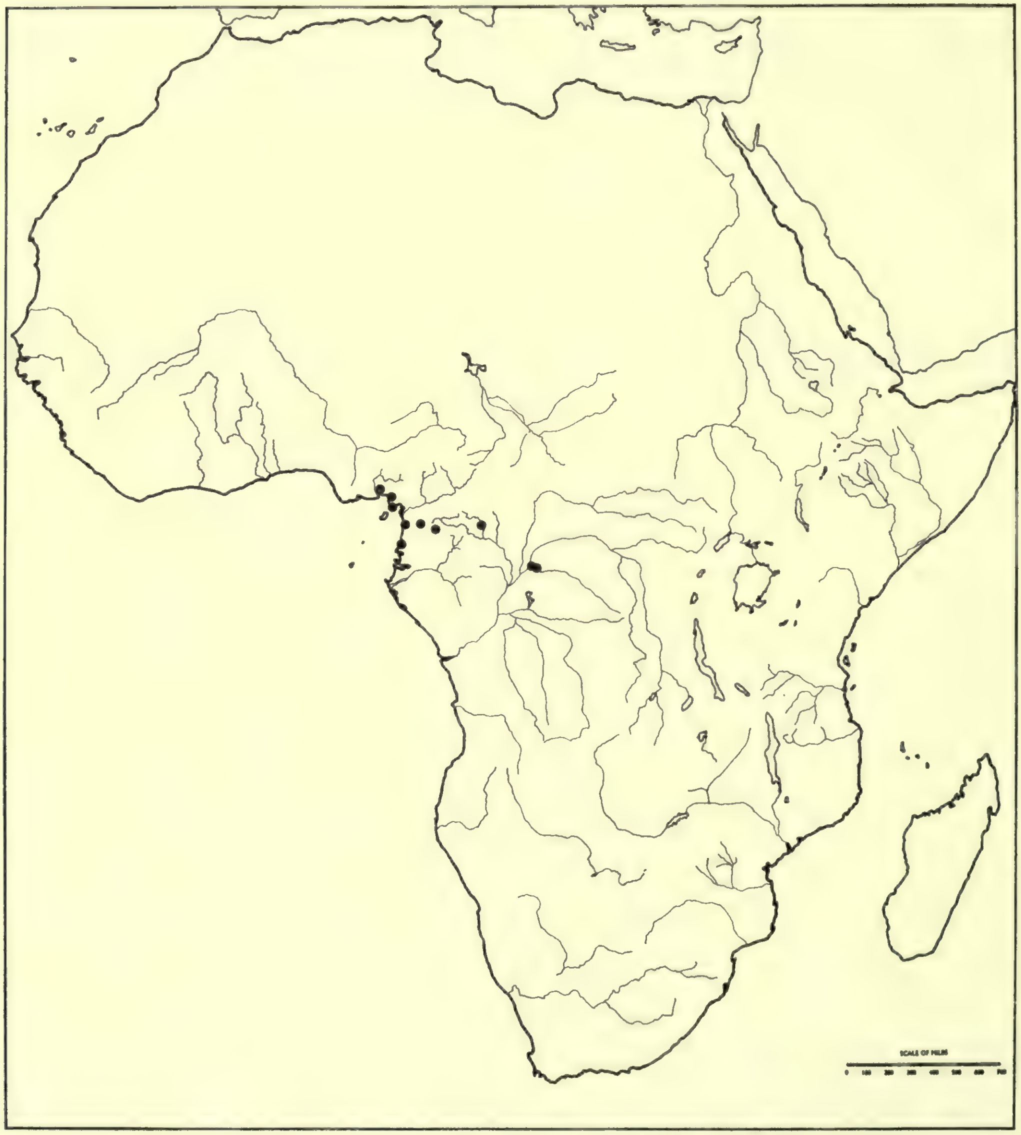
Pronotum with front margin deeply, hind margin shallowly emarginate. Legs rather thick.

Measurements (8 specimens from 3 localities) in millimetres.



MAP 4. Collecting localities of *Macrotermes ivorensis*.

	Range	Mean
Head length	6·26–7·10	6·66
Head width	5·45–6·17	5·78
Head depth inc. gula	3·10–3·72	3·36
Length of gula	4·09–4·55	4·28
Maximum width of gula	1·34–1·59	1·42
Minimum width of gula	0·86–1·00	0·93
Length of left mandible	4·32–4·54	4·43



MAP 5. Collecting localities of *Macrotermes lilljeborgi*.

Length of hind tibia	5·31–6·45	5·95
Maximum length of pronotum	1·91–2·13	1·99
Maximum width of pronotum	3·54–3·96	3·77

Minor soldier. Head sepia-brown to black, ventral side usually not lighter than dorsal side. Labrum same colour as head, with light dots around base of setae. Mandibles dark reddish brown to black. Thoracic nota lighter than head capsule, darker than abdomen, the latter brownish yellow.

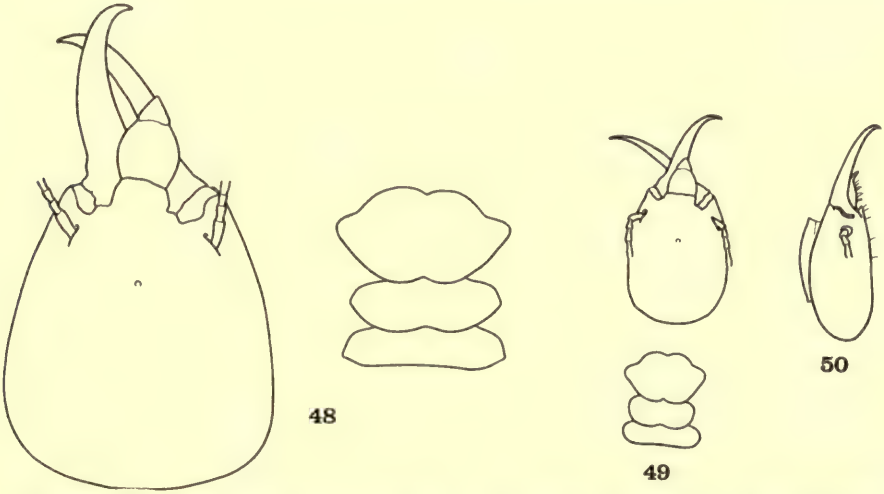
Head in plan view sub-rectangular, sides faintly convex. Mandibles : left one wider than right, median part already incurved (only tip in the right one). Antennae 17-jointed, third segment equal to fourth, longer than fifth to seventh, again equal to 8th–12th.

Front and hind margin of pronotum equally indentated in middle ; lateral angles acute, antero-lateral sides distinctly more concave than postero-lateral. Mesonotum narrower than pronotum, hind margin emarginate ; metanotum as wide as pronotum, hind margin flat.

Measurements (14 specimens from 5 localities) in millimetres.

	Range	Mean
Head length	2·83–3·82	3·11
Head width	2·07–2·82	2·30
Head depth inc. gula	1·49–2·00	1·60
Length of gula	1·94–2·53	2·10
Maximum width of gula	0·64–0·85	0·74
Length of left mandible	2·22–2·99	2·47
Length of hind tibia	3·86–5·04	4·38
Maximum length of pronotum	1·11–1·32	1·15
Maximum width of pronotum	1·62–2·25	1·77

Major worker. According to Sjöstedt (1900*a* : 85), the head width of the major worker ranges from 3 to 3·4 mm. The type collection yields a mean value of 3·22 mm ; other specimens, however, are slightly below 3·0 mm.



FIGS 48–50. *Macrotermes lilljeborgi*, soldiers. 48. Major soldier, head capsule and thoracic nota, plan view. 49–50. Minor soldier : 49, head capsule and thoracic nota, plan view ; 50, head capsule, side view.

The major soldier of *M. lilljeborgi* has very long mandibles. Even with the 4·14 mm measured by Emerson (1928 : 442), the whole range is still beyond that of any other *Macrotermes*.

Sjöstedt (1900*a* : 84, 91) mentions the deep indentation of the front margin of the pronotum in the major worker. This has also been observed in the soldier caste ; the segment, however, remains quite different from that of *Pseudacanthotermes*.

Type Material. CAMEROON : Kitta, 17.iii.1891 (*Y. Sjöstedt*), syntype soldier in Stockholm (Sj. Coll. No. 212). Other syntypes in A.M.N.H., B.M.(N.H.) and I.R.S.N.

Other Material. CAMEROON : Kunabembe (2°30′–3°20′ N., 14°30′–15°30′ E.), 3.iii.1911 (*Arn. Schultze*), Stockh. ; Nyong R., 13.xii.1949 (*Birket-Smith & Dahl*), (Universitetets Zoologiske Museum, København), and B.M.(N.H.) ; Sangmelima, no date recorded (*B. C. Z. Evans*), A.M.N.H. ; Victoria, 8.i.1913 (*F. Silvestri*), (Silvestri collection, Portici), and A.M.N.H.

NIGERIA : Eastern Region ; Old Calabar, *c.* 1900, collector unknown, B.M.(N.H.).

CONGO : Bamania, 0°01′ N., 18°24′ E., i.1921 (*H. Schouteden*), Terv., Stockh. and A.M.N.H. ; Eala, no date (*P. Staner*), Terv.

A total of 9 nest series were examined. Two samples, from Kribi (Mus. Berlin ; Sjöstedt, 1900*a* : 87) and San Benito River (Muséum Paris ; Sjöstedt, 1904 : 49), could not be examined ; the determinations being thought reliable, the localities have accordingly been reported on Map 5, above.

Neither Sjöstedt (1896) nor Silvestri (1914) could find the nest, and the imago of *M. lilljeborgi* is therefore unknown. Since this caste has not been collected, the minor workers do not seem to accompany the foraging expeditions.

The geographical range of the species is thought to extend from the Cameroon to primary forest regions of the Congo, near the Equator. The scanty material suggests that other forest *Macrotermes*, esp. *M. muelleri*, are much more abundant than *M. lilljeborgi*, or at least much easier to find.

Macrotermes mossambicus (Hagen) **stat. n.**

(Text-figs 51–64 ; Map 6)

Termes bellicosus var. *mossambica* Hagen, 1858 : 59–83 ; 118–121. Type-locality : MOZAMBIQUE.

Termes (*Termes*) *Michaelseni* Sjöstedt, 1914*a* : 77. Type-locality : SOUTH-WEST AFRICA, Okahandja, **syn. n.**

Macrotermes bellicosus (Smeathman) form *kunenensis* Fuller, 1922 : 73. Type-locality : SOUTH-WEST AFRICA, Omango, **syn. n.**

Macrotermes bellicosus (Smeathman) form *limpopoensis* Fuller, 1922 : 73. Type-locality : SOUTH AFRICA, Messina, **syn. n.**

Macrotermes bellicosus-tonga Fuller, 1927. Type-locality : SOUTH AFRICA, Upper Mkuzi Drift, **syn. n.**

Imago. Head capsule dark chestnut-brown, lighter around fontanelle. Postclypeus same colour as head, with dark median line. Mandibles with base slightly paler than postclypeus, tip black. Pronotum same colour as head, with fairly conspicuous moth-shaped light mark in the middle (other light marks rather indistinct). Abdominal tergites slightly, sternites distinctly lighter than thoracic nota. Tibiae darker than femora. Wings light yellowish brown.

Vertex of head capsule moderately depressed, with small median longitudinal ridge, pilose with light area around base of setae. Fontanelle prominent, surrounded by numerous setae. Eyes large, sub-circular and prominent ; ocelli very large, short oval, distant from the eye by $\frac{1}{3}$ to $\frac{1}{4}$ (exceptionally $\frac{1}{5}$) of their major diameter. Postclypeus moderately inflated, anterior margin straight. Antennae 19-jointed, second segment the shortest, third about twice the second, and longer than fourth.

Pronotum with conspicuous setae on margins and disc, antero-lateral corners acute, sides straight, hind margin short.

Measurements in millimetres : ♀ holotype (dried specimen)—range and mean of 25 specimens from 18 localities :

	Holotype	Range	Mean
Head width across eyes	3·41	3·29–3·74	3·50
Eye major diameter	1·23	1·14–1·33	1·20
Ocellus major diameter	0·50	0·45–0·60	0·52
Ocellus minor diameter	0·40	0·32–0·47	0·39
Ocellus ex eye	0·10	0·10–0·23	0·15
Median length of pronotum	1·68	1·63–1·87	1·77
Maximum width of pronotum	3·32	3·09–3·70	3·43
Length of hind tibia	4·40	4·26–4·99	4·54
Length of fore wing	33·00	33·00–37·00	35·10
Maximum width of fore wing	8·50	8·20–10·00	9·30

Major soldier. Head capsule reddish brown to dark brown, ventral side usually same colour as dorsal and gula not darker than ventral genae. Mandibles, although not uniformly coloured, darker than head. Thoracic nota darker than head capsule, abdominal tergites paler than thoracic nota.

Head capsule in plan view parallel-sided, hind margin flattened ; in side view thick, with characteristically truncated forehead. Fontanelle protruding, followed anteriorly by two conspicuous diverging grooves. Mandibles incurved and upcurved, left one hooked or sickle-shaped, short, its length inferior to head depth. Hyaline tip of labrum with sides convex to straight. Antennae 17-jointed, third segment shorter than twice the second. Lighter area around base of setae, otherwise pilosity not distinctive.

Pronotum almost twice as wide as long, with antero-lateral sides evenly concave, front and hind margin conspicuously emarginate in the middle ; sides of metanotum angular.

Hind tibia short, not exceeding 3·5 mm.

Measurements (171 specimens from 104 localities) in millimetres :

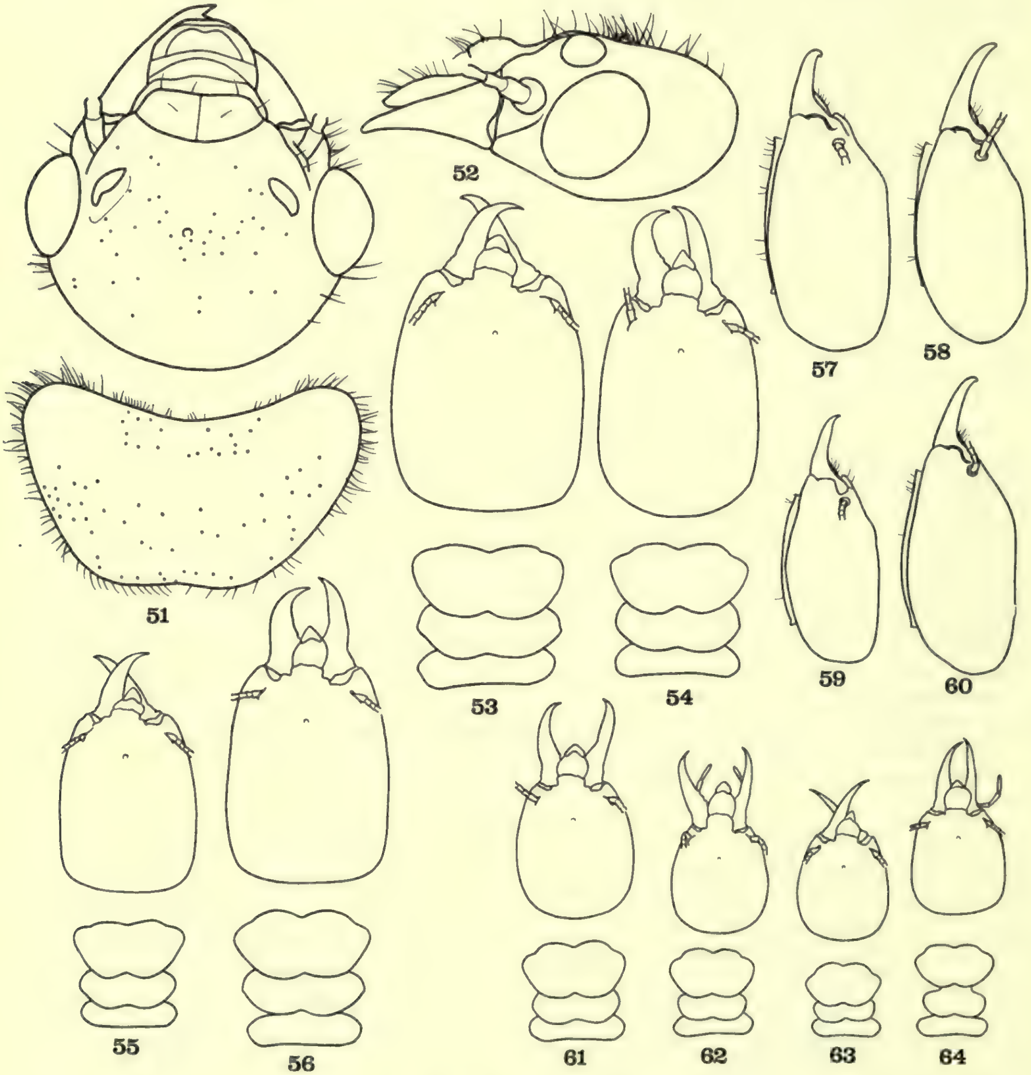
	Range	Mean
Head length	4·26–5·68	5·02
Head width	3·22–4·32	3·74
Head depth inc. gula	2·15–2·91	2·53
Length of gula.	3·04–3·68	3·36
Maximum width of gula	1·07–1·37	1·23
Minimum width of gula	0·78–1·04	0·88
Length of left mandible	2·15–2·91	2·40
Length of hind tibia.	2·47–3·45	2·97
Maximum length of pronotum . . .	1·33–1·81	1·58
Maximum width of pronotum . . .	2·50–3·68	3·10

Minor soldier. Head capsule uniformly orange-brown, only sides of gula darker. Mandibles black with reddish base. Antennae usually darker, without the reddish tinge of head capsule. Thoracic nota brownish, margins darker than middle. Abdominal tergites lighter than, or same colour as, thoracic nota ; sternites lighter than tergites. Femora and tibiae whitish, tarsi darker.

Head in plan view short ovate, rather wide. Fontanelle conspicuous, followed anteriorly by a shallow ridge extending towards the clypeus. Mandibles broad, left one more incurved than right, apical part only slightly more incurved than basal part.

Metanotum distinctly wider than mesonotum, sides rather angular than rounded.

Measurements (180 specimens from 76 localities) in millimetres :



FIGS 51–64. *Macrotermes mossambicus*, imago, soldiers. 51–52. Imago : 51, head capsule and pronotum, plan view ; 52, head capsule, side view. 53–60. Major soldier : 53–56, head capsule and thoracic nota, plan view : 57–60, head capsule, side view. 61–64. Minor soldier, head capsule and thoracic nota, plan view.

	Range	Mean
Head length	2·22–3·35	2·79
Head width	1·84–2·80	2·33
Head depth inc. gula	1·23–1·85	1·53
Length of gula	1·44–1·94	1·67
Maximum width of gula	0·68–0·87	0·77
Length of left mandible	1·64–2·27	1·92
Length of hind tibia	1·85–2·57	2·21
Maximum length of pronotum	0·91–1·34	1·11
Maximum width of pronotum	1·55–2·36	1·95

Major worker. Head capsule reddish brown, in plan view posteriorly rounded ; head width (126 specimens from 35 localities) : range 2·11–2·91, mean 2·54 mm.

Variation. In the imagos, Sjöstedt (1914*a*) had noticed that the pronotum is wider than the head across eyes ; this does not constitute a specific character. Neither is the fore wing always wider in *M. mossambicus* than in *M. subhyalinus*. Otherwise, in this and in the soldier caste, no consistent geographic variation has been found worth mentioning.

This species is similar to *M. subhyalinus* ; the ranges of quantitative characters overlap broadly. However, in the imagos the pilosity of the head capsule and the large size of the eyes and ocelli, in the major soldier the overall size, the curvature of the left mandible and the profile of the head capsule, in the minor soldiers the width and the angular shape of the metanotum usually allow a correct identification at first glance. (The difference between mesonotum and metanotum width in major soldiers is not a reliable character, although the metanotum is, more often than not, wider than the mesonotum in *M. mossambicus*.)

In addition to specimens of *M. michaelseni*, the junior synonym, the material listed below includes quite a few samples (from Malawi, Rhodesia and South Africa) that had been identified by Fuller as '*M. bellicosus*' or a variety of it.

Type Material. MOZAMBIQUE : no locality, no date (*Peters*), ♀ holotype imago Zoologisches Museum der Humboldt-Universität zu Berlin.

Other Material. TANZANIA : Ruponda, 22.xi.1950 (*W. V. Harris*).

ANGOLA : Pembe, 16°53′ S., 14°57′ E., 8.ix.1956 (*A. Matos*), Dundo and Hamb. ; Caxiaxia, 8°56′ S., 20°38′ E., 18.x.1961 (*Champlon*), Dundo.

ZAMBIA : Kafue Township, 28.x.1966 (*M. G. Bingham*), U. Lov. ; Kafue R., N. of Mazabuka, 17,18.i.1957 (*W. G. H. Coaton*), Magoye, 4 vials, 17.i.1957 (*E. N. Cooling, W. G. H. Coaton*), N.C.I.

MALAWI : Louwangwa Valley nr Tuchila, 4.ix.1956 (*A. W. R. McCrae*) ; 4 and 14 mi. N. of Nchalo Expt Station (16°10′ S., 34°53′ E.), 3 vials, 14., Chikwawa, 14., 5 and 24 mi. fr. Ngabu on Chiromo Rd, 15., 1 and 17 mi. N. of Port Herald, 16., 8 and 12 mi. N. of Chiradzulu, 3 vials, 21., 11 mi. N. of Domasi on Namwera Rd, 22., 3 mi. fr. Monkey Bay on Ft Johnston Rd, 24., 5 mi. fr. Ft Jonhston on Monkey Bay Rd, 2 vials, 25., 2 mi. fr. Bilila on Ft Johnston Rd, 2 vials, 27., 20 mi. fr. Ft Johnston on Zomba Rd, 28., 1 mi. E. of Lake Shirwa, 31.viii., Namatulu Hill (Zomba Distr.), 1., 23 mi. fr. Benga on Salima Rd, 10., 7 mi. fr. Nkata Bay on Ekwendeni Rd, 22.ix.1953 (*W. A. Sands* and *W. Wilkinson*).

MOZAMBIQUE : Porto Amelia, Hamb. (acc. No. 85, 1927) ; Zimbiti (Beira), ii.1910 (*P. A. Sheppard*), Luabo, 24.viii.1957 (*P. J. Cohen*), Buzi R. (Beira), 7 vials, 1915, Xinavane and Umbuluzi R. (Lourenço Marques), 11,14,18.xii.1918 (*Cl. Fuller*), N.C.I. ; Beira, 14.x.1952 (*W. V. Harris*), Vila Fontes, no date (*H. Swale*).

South West Africa : Okahandja, 1910 (*G. Fock*), 1911 (*W. Michaelsen*), type-collection of *Termes michaelseni*, Hamb., Stockh., A.M.N.H., N.C.I. Omango (co-ordinates unknown), 6.xii.1919 (*Hartig*), type collection of *M. bellicosus kunenensis*, N.C.I., B.M.(N.H.) and A.M.N.H. Other Material : Onjatu (21°20′ S., 17°20′ E.), viii.1909 (*D. Hentschel*), Stockh., Hamb., A.M.N.H. and N.C.I. ; Outjo-Okaukuejo, 16.ix.1965 (*J. L. Sheasby*), N.C.I. and A.M.N.H. ; Okapchuri (21°53′ S., 16°30′ E.), viii.–ix.1911 (*M. v. Rudno-Rudzinski*), Hamb. and Stockh. ; Otjiwaronga, 1.iv.1939 and 8.vi.1940, 3 vials (*collector unknown*), 16.xi.1967 (*W. G. H. Coaton*), Outjo, xii.1949 (*v. d. Berg*), Baynes Mts nr Otjinungwa, (17°17′ S., 12°27′ E.), viii.1956 (*R. Story*), Kalidona 100 mi. E. of Okahandja, 2 vials, 28.viii., Ongorosengo (21°16′ S., 18°07′ E.), 31.viii., Etemba (21°20′ S., 18° E.), 6., Okavango R. 10 mi. E. of Andara, 13.ix.1962 (*W. G. H. Coaton*), Katima Mulilo, 2 vials, 29.v.1965 (*A. Barnard*), N.C.I.

Further records from S. W. Africa include 230 samples collected north of the line Usakos–Steinhausen, i.e. 22°30′ S., by a N.C.I. team (*W. G. H. Coaton, G. F. Pretorius, T. L. Sheasby*) from September 1965 to May 1967. The localities have been plotted on the distribution map (Map 6) and a detailed list is available at the B.M.(N.H.).

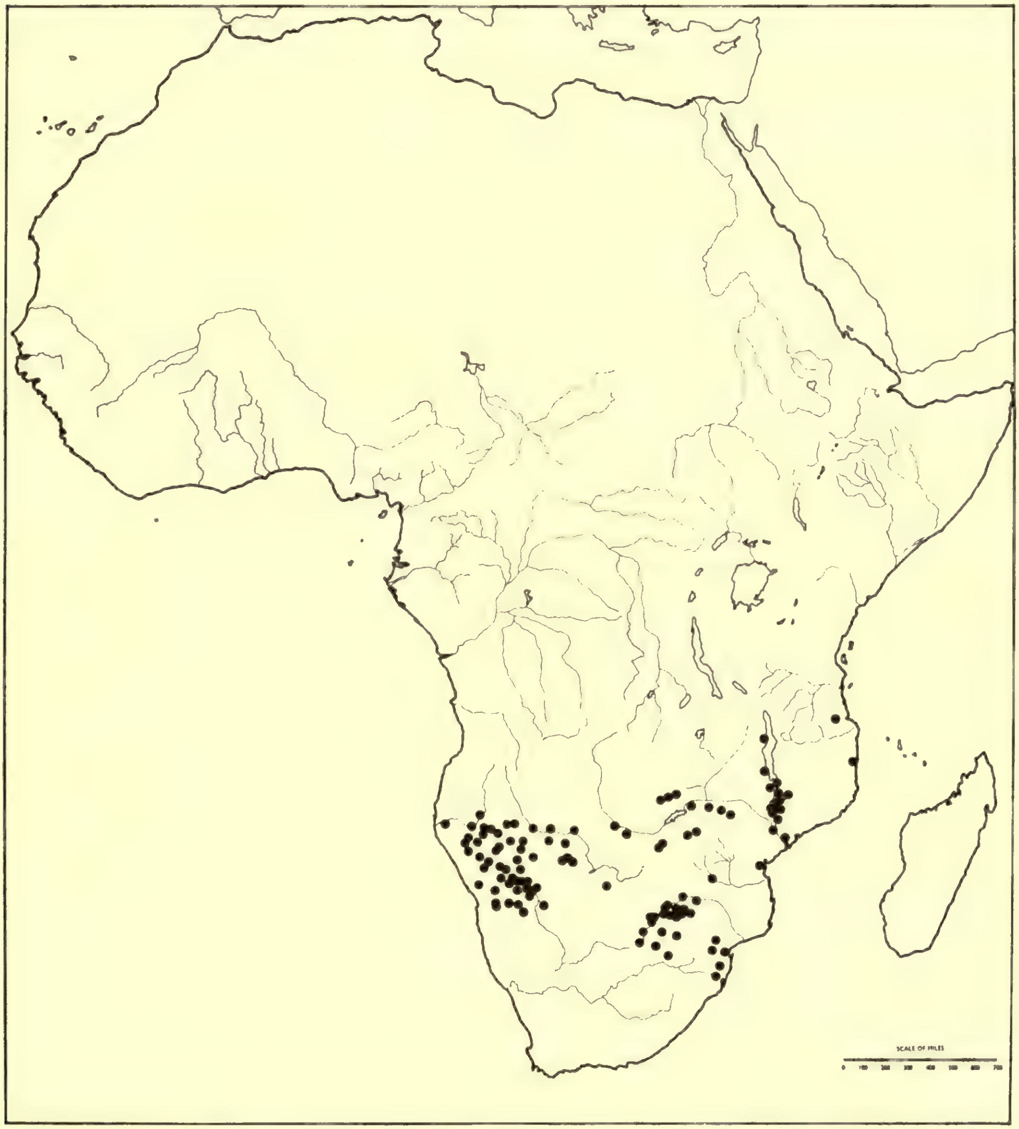
Botswana : Kabulabula, 17°50′ S., 24°58′ E., 20.vii.1930 (*H. Lang*), A.M.N.H. ; Serowe, ix. & xi. 1922 (*collector unknown*), Mahalapye, 11., 60 mi. N.W. of Serowe, 20., Tsukutsa (? Chukudu) Pan, 30.viii.1924 (*C. W. Mally*), N.C.I.

Rhodesia : Gwaai R., 3 vials, 22., Shangani R., 28.vi., Kennedy (18°50′ S., 27°08′ E.), 19.viii., 17.ix.1922 (*R. Jack*), N.C.I. ; Rekomitjie (16°07′ S., 29°23′ E.), 20.x., 22.xi.1964, Mzarabani (16°19′ S., 31°10′ E.), 2.iv., Chibara (16°35′ S., 31°38′ E.), ?.iv., Mashumbi (16°09′ S., 30°33′ E.), ?.viii., Rimuka Siding (18°23′ S., 29°50′ E.), 23.x.1965 (*M. G. Bingham*), U. Lov. ; Zhombe (18°30′ S., 29°20′ E.), 9.xii.1962 (*M. G. Bingham*).

Republic of South Africa : Messina, 24.xi.1916 (*Cl. Fuller*), type collection of *M. bellicosus limpopoensis*, N.C.I., B.M.(N.H.) and A.M.N.H. ; Upper Mkuzi Drift, 17.ix.1922 (*Cl. Fuller*), type collection of *M. bellicosus tonga*, N.C.I. (2 vials), B.M.(N.H.) and A.M.N.H. Other Material. Natal : Junction Inyomite, Pongola and Usutu Rivers, 20.ix, nr Pongola R. (4 mi. S. of Ndumu Store), 22.ix.1922 (*Cl. Fuller*), Lower Mkuzi Drift, i.1924 (*Collins*), Mkuzi Game Reserve, 19.iv.1947 (*D. v. V. Webb*), N.C.I.—Transvaal : Johannesburg, no date (*R. Schwab*), Hamb. ; Middelwit–Ganskuil, 4.x.1961 (*G. F. Pretorius*), N.C.I. and A.M.N.H. ; Omloop nr Vetfontein (22°45′ S., 29°10′ E.), 26.ii.1946 (*P. J. de Lange*), nr Balangani tow. Komatipoort, 12.i., Punda Milia–Louis Trichardt, 30.xii.1959, Pontdrift (22°13′ S., 29°08′ E.), 3.i., Maasstroom (22°40′ S., 28°15′ E.), 5.i., Vleeschfontein–Zeerust, 8.i., Nietverdiend–Zeerust, 9.i.1960 (*P. C. Joubert*), Zeerust–Derdepoort, 2., Kiesel–Cumberland, 6., Buffelsdrif (23°40′ S., 26°55′ E.), 2 vials, 5., Buffelsdrif–Stockpoort and Stockpoort–Beauty, 6., Tom Burke–Swartwater, 8., Pont Drift–Alldays, 11., Martinsdrift (23° S., 27°55′ E.), 19., Tom Burke–Baltimore, 20., Buffelsdrif–Maraheki, 26.iv.1964 (*W. G. H. Coaton*), Maraheki–Kranskop, 3.x.1961, Vivo (23° S., 29°03′ E.), 16., Bochum–Tonash, 17., Tolwe–Maasstroom, 19.iv.1964, Distr. Soutpansberg, 4 vials, 19–22.viii.1968 (*J. L. Sheasby*), Nietverdiend–Derdepoort, 2 vials, 2., Waterpoort–Louis Trichardt, 2 vials, 16., Steenbokpan–Houndslow, 3 vials, 25.iv.1964 (*Coaton & Sheasby*), N.C.I.

SWAZILAND : Hlatikulu, 1920 (*J. H. Pierce*), Lebombo Flats, 5.vi.1921 (*Cl. Fuller*), Ranches Ltd (co-ordinates unknown), no date (*Bartle*), N.C.I.

A total of 386 nest series were examined. Where no museum of deposit is indicated, the material is in the B.M.(N.H.).

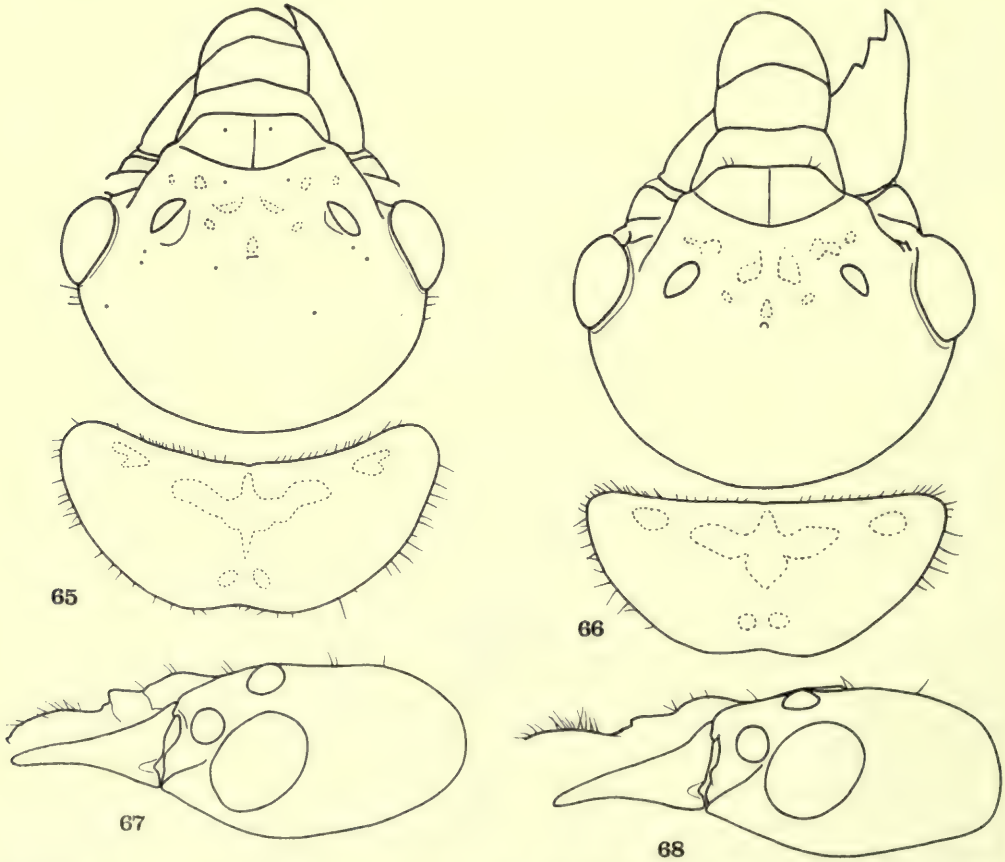


MAP 6. Collecting localities of *Macrotermes mossambicus*.

Climatic data (Coaton, private communication) indicate that *M. mossambicus* can live in fairly dry sub-regions : Okahandja (annual rainfall range, 350–400 mm), Usakos (150–200 mm). In Zambia and Rhodesia, this species is common only in the Zambezi valley area, has not been found at altitudes higher than 1200 m, and tolerates poorly drained, alluvial soils (M. G. Bingham, *in litt.*). In South Africa, it has not been found at higher latitudes than the north-eastern corner of Natal.

The mounds have been described as tall, hard, conical by Michaelsen (*in* Sjöstedt, 1926 : 88) ; Weidner (1961 : 42) records a height of 3·5 m from Angola ; Bingham (*in litt.*) has measured in Zambia a mound 3 m high and 3 × 2 m at the base. No queen cell has hitherto been described, but Fuller's collecting data (1922 : 73) seem to imply its presence.

Alates have been caught near Rekomitjie, swarming soon after dark in the last days of November. Little else is known on the behaviour and ecology of *M. mossambicus*.



FIGS 65–68. *Macrotermes muelleri*, imago : 65–66, head capsule and pronotum, plan view (with details of light marks) ; 67–68, head capsule, side view.

Macrotermes muelleri (Sjöstedt)
(Text-figs 65–76 ; Map 7)

Termes Mülleri Sjöstedt, 1898*a* : 205. Type-locality : GABON, Agoncho.

Termes amplus Sjöstedt, 1899 : 35. Type-locality : CONGO, Umangi [syn. *Termes gabonensis* Sjöstedt, 1907 : 238 ; ssp. rev. *Macrotermes Mülleri* var. *ampla*, Sjöstedt, 1926 : 78 ; syn. *Macrotermes mülleri*, Snyder, 1949 : 215].

Macrotermes Mülleri (Sjöstedt) Sjöstedt, 1926 : 76.

Macrotermes muelleri (Sjöstedt) ; Weidner, 1961 : 32.

(Sjöstedt first changed from *Mülleri* to *gabonensis* (1900*a* : 92) because of *Termes Mülleri* von Ihering (1887). After shifting the species to *Macrotermes*, he took the species-name *Mülleri* again (1926). He was entitled to do this, since *Termes Mülleri* von Ihering lacks a description and therefore is not valid.)

Imago. Head capsule dark sepia-brown to black, lighter beneath. Postclypeus same colour as head, with inconspicuous lighter median line. Mandibles lighter than head, only inner margin black. Pronotum with four light marks on the limit between anterior and posterior lobes. Abdominal sternites lighter than tergites and femora lighter than tibiae. Wings smoky brown, with darker veins.

Head in plan view oval, strongly tapering towards anterior end, with a very few, scattered bristles. Fontanelle depressed, inconspicuous and not surrounded by small hairs. Eyes relatively small, not prominent ; ocelli broadly oval, distant from the eyes by a little less than their major diameter. Postclypeus almost flat. Antennae 19-jointed, third segment distinctly longer than others.

Pronotum more than twice as wide as long, but usually narrower than head across eyes ; front margin straight to concave, barely emarginate in the middle, hind margin emarginate, a few short hairs on margins.

Measurements (32 specimens from 13 localities) in millimetres :

	Range	Mean
Head width across eyes	3·80–4·50	4·09 (°)
Eye major diameter	1·09–1·38	1·21
Ocellus major diameter	0·41–0·50	0·47
Ocellus minor diameter	0·33–0·43	0·38
Ocellus ex eye	0·28–0·52	0·43
Median length of pronotum . . .	1·58–1·87	1·71
Maximum width of pronotum . .	3·48–4·52	3·96
Length of hind tibia	4·45–5·61	4·88
Length of fore wing	29·20–38·00	33·30
Maximum width of fore wing . .	7·50–9·00	8·40

(°) After Wasmann (1911) : 5 mm. The specimen could not be re-determined and has probably been lost.

Major soldier. Head capsule dark reddish brown, lighter beneath, gula darker than ventral genae. Mandibles uniformly black. Thoracic nota about as dark as head capsule, but without reddish tinge ; pronotum with a light cross-shaped mark on the middle and two fairly distinct light dots on each side, mesonotum with light mark in the middle extending to the hind margin. Abdominal tergites not lighter, sternites distinctly lighter than thoracic nota.

Head capsule in plan view pear-shaped ; fontanelle slightly protruding, followed anteriorly by a faint median ridge. Mandibles slightly longer than half the length of head capsule ; rather evenly incurved, left one more incurved and wider than right one. Sides of hyaline tip of labrum concave. Antennae 17-jointed, 3rd segment about twice as long as 4th. Pilosity sparse.

Pronotum distinctly narrower than head capsule and relatively long, lateral corners acute.

Sides of mesonotum angular ; of metanotum parallel, but more or less truncated towards hind margin. Metanotum wider than mesonotum.

Hind tibia longer than 4·5 mm in most cases.

Measurements (224 specimens from 38 localities) in millimetres :

	Range	Mean
Head length	5·35–6·60	6·01
Head width	4·52–5·90	5·21
Head depth inc. gula	2·76–3·50	3·10
Length of gula.	3·45–4·32	3·81
Maximum width of gula	1·07–1·33	1·19
Minimum width of gula	0·65–0·86	0·73
Length of left mandible	3·00–3·55	3·29
Length of hind tibia.	4·26–5·55	4·89
Maximum length of pronotum . . .	1·72–2·00	1·86
Maximum width of pronotum . . .	2·91–3·61	3·25

Minor soldier. Head capsule uniformly dark red-brown, gula not darker. Mandibles dark brown to black, antennae lighter than head. Pronotum same colour as head capsule, other thoracic nota and abdominal tergites a little lighter. Sternites distinctly lighter than tergites, legs (without any conspicuous difference between femora, tibiae, tarsi) about the same colour as the sternites.

Head in plan view quadrate—elongate, angles rounded ; fontanelle slit-like, inconspicuous. Labrum large, reaching about half the length of the mandibles ; the latter long and slender. Gula in side view evenly convex.

Thoracic nota : pronotum diamond-shaped, front margin indentated, hind margin incurved ; mesonotum trapezoidal, hind margin incurved ; metanotum rectangular, about $\frac{3}{10}$ wider than mesonotum, hind margin straight.

Length of hind tibia nearly twice the head width.

Measurements (138 specimens from 31 localities) in millimetres :

	Range	Mean
Head length	2·11–3·15	2·64
Head width	1·53–2·31	1·90
Head depth inc. gula	1·15–1·49	1·33
Length of gula	1·58–2·11	1·81
Maximum width of gula	0·59–0·72	0·62
Length of left mandible	1·63–2·18	1·91
Length of hind tibia.	3·26–4·35	3·70
Maximum length of pronotum . . .	0·86–1·18	1·04
Maximum width of pronotum . . .	1·20–1·85	1·53

Major worker. Head capsule reddish brown, darker above antennal sockets ; in plan view paraboloid, maximum width near external articulation of mandibles ; this width (89 specimens from 17 localities) : range 2·50–2·93, mean 2·73 mm.

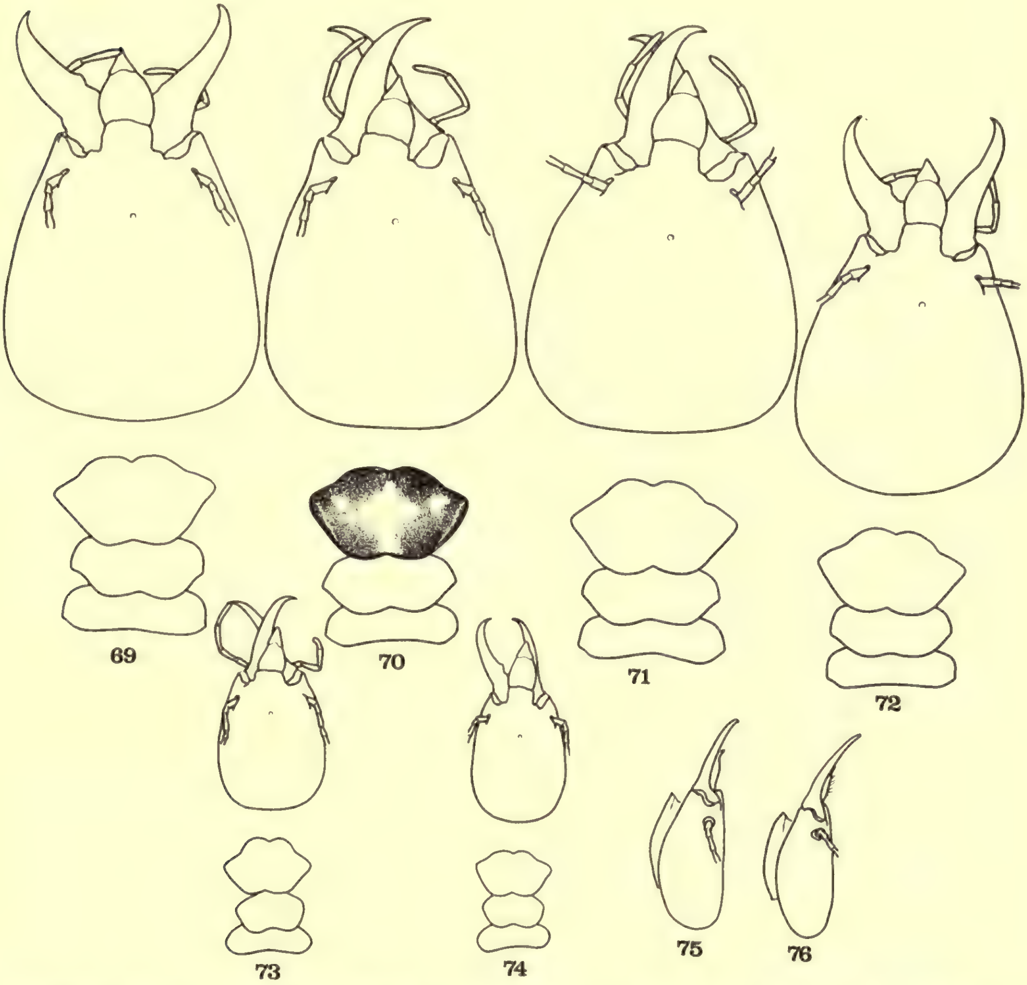
Variation. In spite of Text-fig. 70, which is given as an example, the light marks on the pronotum are not species-specific : they are simply more conspicuous in dark-coloured specimens throughout the genus. The major soldiers of this species may be darker or lighter ; in the minor soldiers, the difference of coloration between thoracic and abdominal tergites may be nil to distinct. Some imagos (Emerson, 1928) have their pronotum wider than the head, but this is not the rule. The antennae may be 18-jointed in the soldier caste, both the minor (Weidner, 1961 : 33) and the major (Emerson, 1928 : 443). In the latter, the metanotum has always been found wider than the mesonotum.

Lastly, some samples from the Western part of the Congo (Text-fig. 72) are smaller than average ; no distinct subspecies, however, could be recognized.

The de-alated imagos of *M. muelleri* resemble those of *M. vitrialatus ;* their eyes, however, are usually bigger, their ocelli more elongate and their pronotum proportionately wider. The mean index pronotum length/pronotum width in the major soldier is the highest of the genus. The index hind tibia length/head width in minor soldiers, as studied by Grassé & Noirot (1951 : 332), has been checked with the figures now available, and found slightly lower than previously thought : 1·95 (2·0). For comparison, *M. bellicosus* yields a value of 1·01, *M. vitrialatus* 1·44.

Type Material. GABON : Agoncho (probably 10° E. on the Equator), ix.–x.1874 (*R. Buchholz*), major and minor soldiers, workers (Museum Greifswald,) syntypes in Stockh. and A.M.N.H. CONGO : Mukimbungu (inc. Boko, Madzia), 1904–1906 (*K. E. Laman*), morphotype and paramorphotype imagos, Stockh., Terv., A.M.N.H.

Other Material. CAMEROON : Batouri, 1935 (*F. G. Merfield*), B.M.(N.H.).



FIGS 69–76. *Macrotermes muelleri*, soldiers. 69–72. Major soldier, head capsule and thoracic nota, plan view (70, with details of light marks). 73–76. Minor soldier : 74, head capsule and thoracic nota, plan view ; 75–76, head capsule, side view.

CENTRAL AFRICAN REPUBLIC : Boukoko nr M'Baiki, vii.1948 (*C. Noirot*), own collection and U. Lov.

CONGO (Brazzaville) : Ngoko (*Gravot*), Matélé (0°31′ N., 16°38′ E.), 1924 (*Karlsson*), Stockh.

CONGO : Umangi, ix., xi.1896 (*E. Wilverth*), type collection of *T. amplus* Sj., major soldiers in I.R.S.N., syntypes in Stockh. Other Material : Lisala, 19.ix.1966 (*J. E. Ruelle*), U. Lov. and B.M.(N.H.) ; Basongo, vii.1921 (*H. Schouteden*), Boma Sundi (5°20′ S., 12°50′ E.), 27–29.viii.1913 (*J. Bequaert*), Kisangani (ex : Stanleyville), no date, 3 vials (*Arrhenius, H. Kohl*), 29.v.1933 (*Vrijdagh*), 1948 (*A. E. Emerson*), Terv., Stockh., A.M.N.H. ; Yalosemba (2°35′ N., 21°50′ E.), 21,23.ix.1966 (*J. E. Ruelle*), U. Lov., Terv., N.C.I. ; Yambata, ii.–iii.1914, 3 vials (*de Giorgi*), Oshwe [not ' Obswe '], xii.1913 (*J. Maes* [not ' Mals ']), Mayumbe (*c.* 5° S., 13° E.), no date (*De Briey* [not ' De Bricy ']), Bikoro [not ' Bikaro '], iii.1921, Mongende [not ' Mongenge '] (2°06′ S., 16°20′ E.), 22.iv.1921 (*H. Schouteden*), Terv., Stockh. ; Medje, 19.ix.1910 (*Lang-Chapin*), Terv., A.M.N.H. ; Mpese, no date (*Cooreman*), 8.viii.1959 (*J. E. Ruelle*), I.R.S.N., U. Lov. ; Inga (5°30′ S., 14°30′ E.), 29.iv., Imbela (5°54′ S., 17°08′ E.), 21.viii.1959 (*J. E. Ruelle*), U. Lov., A.M.N.H. ; Banalia, 7.xii.1913 (*J. Bequaert*), Barumbu–Simba (1°15′ N., 23°29′ E.), v.1927 (*J. Ghesquière*), Boende, 1934 (*Dubois*), Buta, 1912 (*Hutereau*), Karawa, 1936 (*Wallin*), Lokandu (2°34′ S., 25°44′ E.), v.1939 (*Marée*), Lusambo, 1898 (*E. Luja*), Moerbeke (5°30′ S., 14°55′ E.), no date (*collector unknown*), Mongbwalu, vii.1938 (*Scheitz*) and iii.1939 (*R. Lepersonne*), Walungu (2°40′ S., 28°50′ E.), 1938 (*Hautmann*), Moto (3°02′ N., 29°30′ E.), 10.xi.1923, Tora, 1920, 13.vi., 12.x.1926, 4 vials (*L. Burgeon*), Ganda Sundi (4°47′ S., 12°54′ E.), ix.1920, Mushie, vi.1921, Mauda (4°05′ N., 27°41′ E.), iii.1925, Kunungu (2°06′ S., 16°26′ E.), 1937 (*H. Schouteden*), Terv. ; Bambesa (3°23′ N., 25°47′ E.), no date (*Vrijdagh*), I.R.S.N. ; Lukolela (1°10′ S., 17°11′ E.), 2.vi.1948 (*Å. Ånberg*), Camp Putnam (1°23′ N., 28°30′ E.), 11.v., Yangambi, 28–30.v.1948 (*A. E. Emerson*), Batama, 17.ix.1909, Akenge (2°55′ N., 26°50′ E.), x.1913 (*Lang-Chapin*), A.M.N.H. ; Takundi, 19.iv.1964 (*G. Mathot*), Kitona (5°28′ S., 17°42′ E.), 19.viii.1959, Mbata Kiela (5°15′ S., 12°55′ E.), 1.i.1965, Mondongo (2°10′ N., 21°10′ E.), 13, 29.ix., Boumbu (2°40′ N., 21°50′ E.), 25.ix.1966 (*J. E. Ruelle*), U. Lov.

SUDAN : Lado (? Lado Mt), no date (*Hanolet*), I.R.S.N.

ANGOLA : Dundo, 3.i.1961 (*A. de Barros Machado*), Dundo.

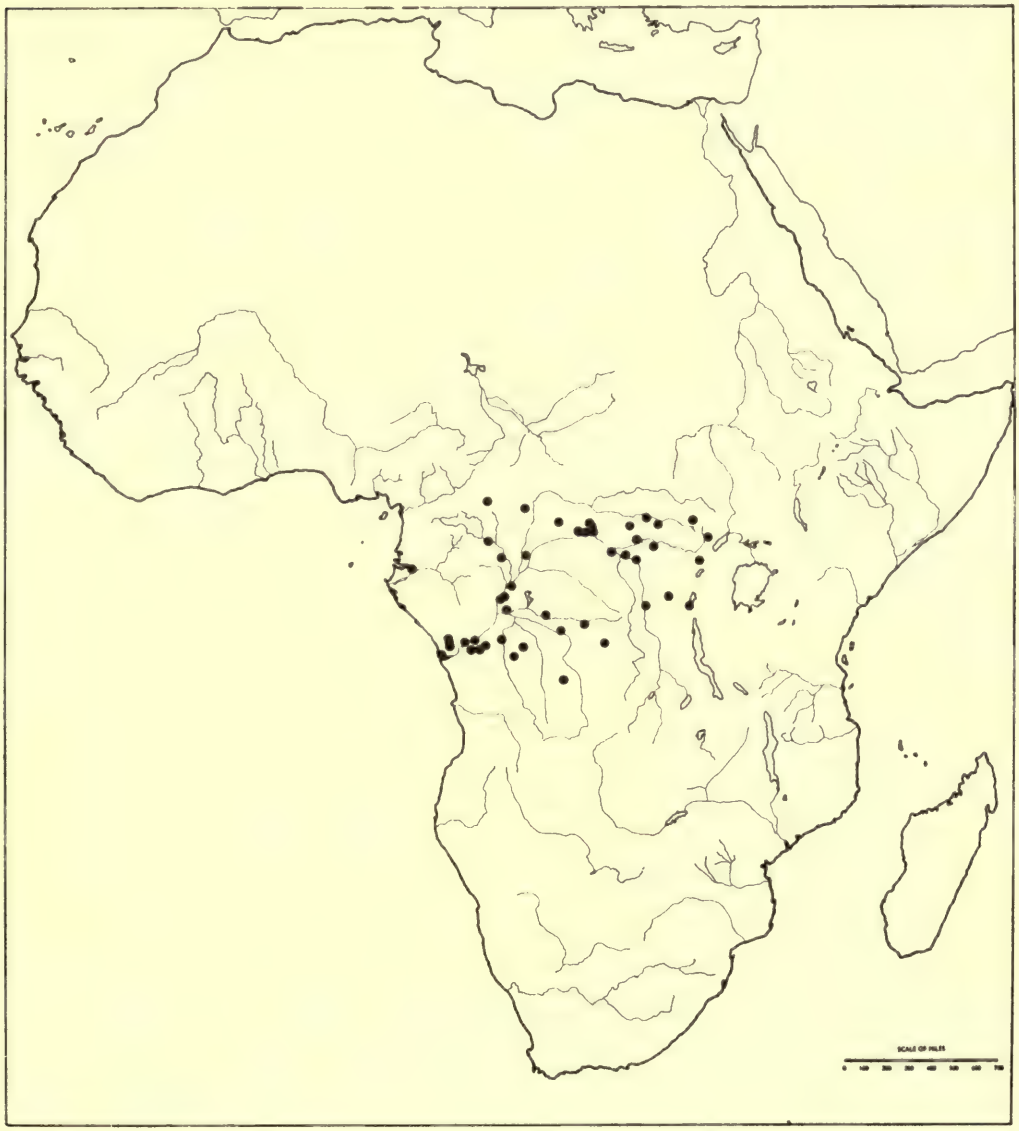
A total of 104 nest series were examined.

This species is the most abundant of the forest *Macrotermes* ; its distribution has already been discussed above. In view both of its habitat and of the extensive collections carried out in Nigeria and in southern regions of Africa, it is unlikely that further research will reveal significant differences from the present geographical range.

The nests have already been described (Grassé & Noirot, 1951 ; Weidner, 1961 after de Barros Machado) ; but neither a queen cell nor even a physogastric queen could be found. An earlier account (E. Luja, quoted in Wasmann, 1911) is unreliable, since the collector appears to have mixed *M. bellicosus* and *M. muelleri* in his field notes. Recently (1966), reproductive imagos were collected in the

Congo (Mondongo) from two mounds, 2·5 and 3·0 m high ; in both cases the queen was found in an ordinary nest chamber (well above ground level) and the male escaped detection. This, with previous fruitless efforts, and the literature cited, support the conclusion that *M. muelleri* usually does not enclose its royal pair in a distinctive chamber.

The circular or semi-circular leaf cuttings, brought home from the foraging expeditions and illustrated among others by Grassé & Noirot (1951 : 315), are found



Map 7. Collecting localities of *Macrotermes muelleri*.

not only with the forest *Macrotermes*, but with *M. vitrialatus* as well. The swarming habits of *M. muelleri* are still unknown.

Macrotermes natalensis (Haviland)

(Text-figs 21, 77–90 ; Map 8)

Termes natalensis Haviland, 1898 : 383. Type locality : REPUBLIC OF SOUTH AFRICA, Natal [Estcourt, cf. Harris, 1966*a*].

Macrotermes natalensis (Haviland) Fuller, 1922 : 73.

Macrotermes natalensis var. *durbanensis* Fuller, 1927 : 135. Type locality : REPUBLIC OF SOUTH AFRICA, Durban, **syn. n.**

What has been said about *M. bellicosus* could be repeated here to help sorting out the misidentifications in the literature, such as those of Trâgårdh (1904 : 6), Wasmann (1911 : 92), Sjöstedt (1913 : 363) (1915 : 12), Emerson (1928 : 447), Grassé (1937*a*, 1944), etc.

Imago. Head capsule chestnut to smoky brown, with lighter area around fontanelle ; postclypeus lighter, with dark median line ; base of mandibles intermediate between head capsule and postclypeus, tip black. Pronotum slightly lighter than head, with a sometimes conspicuous moth-shaped mark. Abdominal tergites and sternites not distinctly lighter than thorax. Tibiae darker than femora. Wings smoky.

Head in plan view rather short (i.e. the width across eyes is great in relation to the distance between the anterior margin of the postclypeus and the posterior margin of the head capsule), its hind margin regularly convex. Fontanelle in a depression, not very conspicuous, but surrounded by short setae and followed anteriorly by a median carina ; the head otherwise sparsely pilose. Eyes sub-pentagonal, neither large nor particularly prominent. Ocelli subcircular to elongate, distant from the eye by about ½ of their major diameter. Postclypeus wide (slightly wider and less inflated than in *bellicosus*). Antennae 19-jointed, 3rd segment twice as long as 2nd.

Pronotum ' subsemilunar ' (Haviland), front and hind margins not or barely emarginate, lateral corners rounded, sides convex.

Hind tibia short.

Measurements in millimetres : ♀ lectotype—range and mean of 89 specimens from 47 localities :

	Lectotype	Range	Mean
Head width across eyes	3·61	3·03–3·68	3·43
Eye major diameter	1·10	0·88–1·16	1·03
Ocellus major diameter	0·42	0·33–0·53	0·41
Ocellus minor diameter	0·33	0·23–0·37	0·30
Ocellus ex eye	0·24	0·18–0·32	0·24
Median length of pronotum . . .	1·80	1·61–1·94	1·79
Maximum width of pronotum . . .	3·59	3·11–3·59	3·34
Length of hind tibia.	4·27	3·81–4·77	4·11
Length of fore wing	34·0	33·0–38·0	34·6
Maximum width of fore wing . . .	9·0	8·0–10·0	9·0

Major soldier. Head capsule yellow to dark ferruginous brown, apical part darker than base, ventral side as often as not same colour as dorsal side ; gula, however, darker than ventral genae. Mandibles usually black throughout. Thorax lighter than head, margins of nota smoky brown. Tibiae barely, if at all, darker than femora ; tarsi darker than tibiae.

Head capsule in plan view ' ovate-quadrate ' (Haviland) to ' horseshoe-shaped ' (Fuller), sides moderately convex ; fontanelle more conspicuous than in *M. bellicosus*, i.e. wider and slightly protruding ; frontal grooves shallow, but sometimes similar to those of *M. subhyalinus*.

Sides of hyaline tip of labrum straight to convex. Mandibles long, upturned from the base (not really upcurved, as is the case with *M. mossambicus*), moderately and fairly regularly incurved, left one not much wider than right. Antennae 17- to 18-jointed, 1st segment longer than 3rd, 3rd longer than 4th, 2nd the shortest. Pilosity variable, rather sparse on head and thorax, often dense on abdomen ; lighter area around base of setae rarely conspicuous.

Anterior and posterior margins of pronotum equally indented, lobes rounded, antero-lateral sides notched ; meso- and metanotum nearly as wide as pronotum, sides rounded, hind margin of metanotum concave to straight ; the thoracic nota, on the whole, distinctly more chitinized than in *M. bellicosus.*

Measurements in millimetres : morpholectotype—range and mean of 203 specimens from 128 localities :

	Morpholectotype	Range	Mean
Head length	4·97	4·13–6·21	5·15
Head width	4·00	3·26–4·89	4·13
Head depth inc. gula	2·65	2·16–3·15	2·65
Length of gula	3·12	3·12–3·56	3·35
Maximum width of gula	1·30	1·17–1·32	1·22
Minimum width of gula	0·94	0·91–1·07	0·98
Length of left mandible	2·89	2·52–3·14	2·85
Length of hind tibia	3·01	2·60–3·65	3·07
Maximum length of pronotum	1·67	1·43–1·90	1·69
Maximum width of pronotum	3·25	2·55–3·74	3·19

Minor soldier. Head capsule yellow to light chestnut-brown, lighter beneath, gula darker than ventral genae ; mandibles very dark red, base lighter. Thorax yellowish brown, often with outline darker. Abdominal sclerites slightly paler than thorax ; femora lighter than abdomen, tibiae same colour, tarsi darker.

Outline of head capsule in plan view similar to that of major soldier, although shorter and more rounded. Fontanelle conspicuous, but not protruding. Left mandible more incurved than right, and a little more near the tip than in basal part ; in ventral view without any distinct serration of the inner edge.

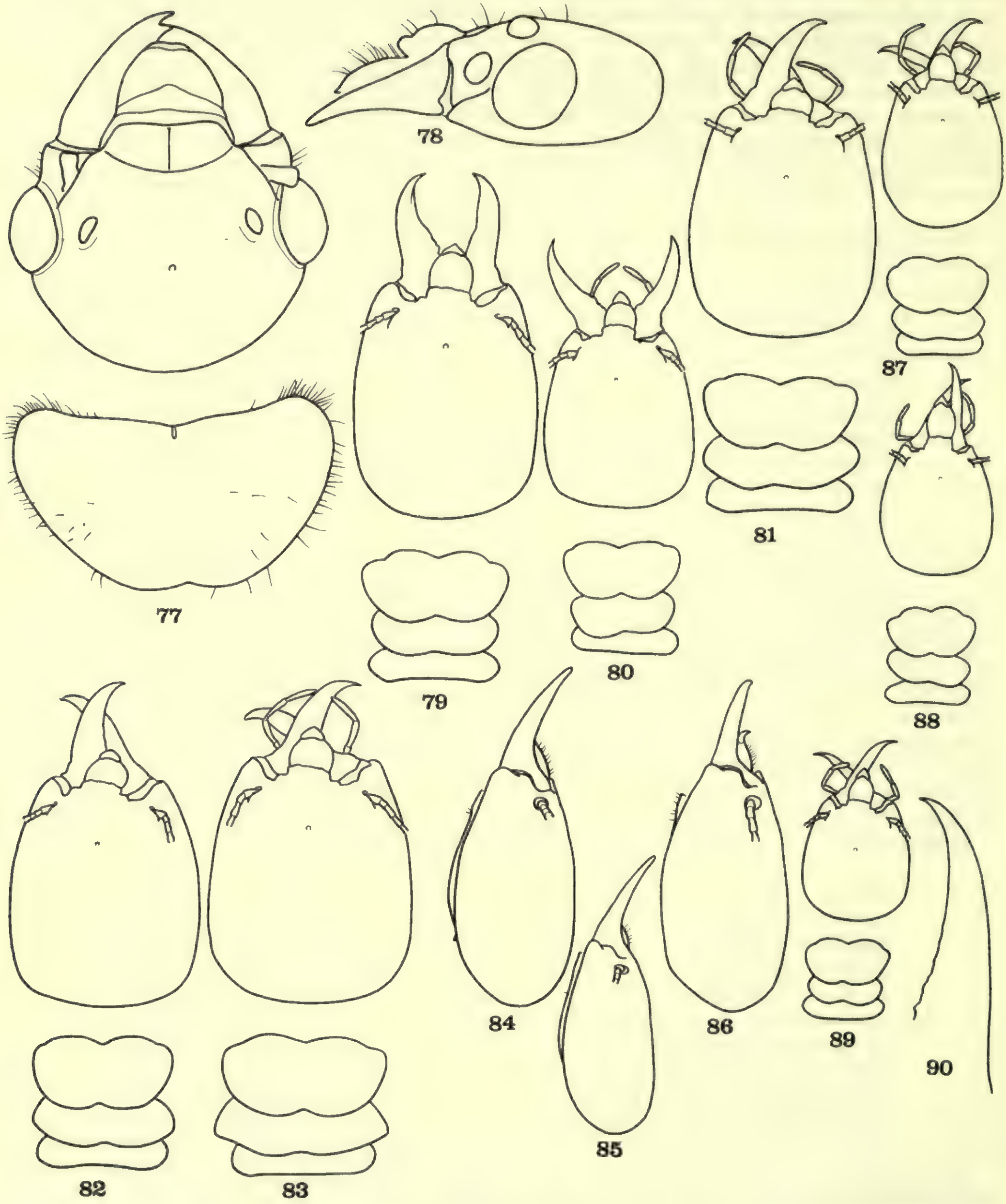
Sides of thoracic nota rounded, metanotum in most cases not distinctly wider than mesonotum.

Measurements (171 specimens from 99 localities) in millimetres :

	Range	Mean
Head length	2·49–3·68	3·02
Head width	2·03–2·99	2·49
Head depth inc. gula	1·39–1·97	1·69
Length of gula	1·69–2·47	1·94
Maximum width of gula	0·75–0·94	0·82
Length of left mandible	1·68–2·42	2·10
Length of hind tibia	1·86–2·67	2·28
Maximum length of pronotum	0·94–1·40	1·16
Maximum width of pronotum	1·62–2·49	2·00

Major worker. 'Head castaneous, epistoma convex ' (Haviland). Posterior margin in plan view nearly semi-circular (text-fig. 21). Head width (63 specimens from 23 localities) : range 2·05–2·65, mean 2·31 mm.

Variation. Statistics on the variability of some quantitative characters can be found in Warren (1909, 1916). The '*natalensis—durbanensis*' variety, although somewhat larger than average, is not really different from the '*natalensis s. str.*', '*nat. transvaalensis*' and other forms described by Fuller ; even specimens from South West Africa cannot be distinguished from those collected on the other side of the Kalahari desert.



Figs 77–90. *Macrotermes natalensis*, imago, soldiers. 77–78. Imago : 77, head capsule and pronotum, plan view ; 78, head capsule, side view. 79–86. Major soldier : 79–83, head capsule and thoracic nota, plan view ; 84–86, head capsule, side view. 87–90. Minor soldier : 87–89, head capsule and thoracic nota, plan view ; 90, left mandible, inner margin.

This species has long been confused with *M. bellicosus*. The major soldiers nevertheless present a distinctive pattern in the dimensions of the left mandible, the hind tibia and the thoracic nota ; such differences were implied in Dr Emerson's unpublished comment on a sample of *M. bellicosus* from Sierra Leone (above). Also, the size of the minor soldiers is larger in *M. natalensis*. The imagos are usually separated by the pilosity and the width of the head capsule, the diameter of the eye (and the distance between eye and ocellus) and the length of the hind tibia ; the index length/width of the pronotum is less reliable.

A certain similarity with *M. subhyalinus* prompted Fuller's opinion (1915 : 458) on the probability of *M. natalensis* being a synonym of '*M. bellicosus*' ; more recently, Noirot (1960) identified as '*Bellicositermes bellicosus* ?' a sample of *Macrotermes* from the Outeniqua Mts (Cape Province). This tentative determination could not be checked, but in view of the geographic distribution found, and of the measurements taken, in the course of this revision, the doubtful sample most probably belongs to *M. natalensis*. As a matter of fact, this species has rarely been collected together with *M. subhyalinus*, but can easily be recognized from the latter in such cases by the mandibles of the major soldiers.

A lectotype imago and a morpholectotype major soldier have been selected from Haviland's type material ; they are listed below with some of the collecting localities.

Type Material. REPUBLIC OF SOUTH AFRICA : Natal, Estcourt, 19.iv.1894 (*G. D. Haviland*), ♀ LECTOTYPE imago, morpholectotype major soldier from type colony No. 37, Museum of Zoology, Cambridge ; topotypes, various dates (*Haviland*), A.M.N.H., B.M.(N.H.), I.R.S.N., N.C.I., 1895 (*Trâgårdh*), Stockh.

Other Material. ZAMBIA : Kitwe, i.1956 (*E. N. Cooling*), Choma, 10–13, 16.i.1957, 8.viii.1959, 11 vials (*W. G. H. Coaton, E. N. Cooling*), N.C.I. and U. Lov.

MALAWI : Chiromo, xi.1906 (*K. Fricke*), Hamb.

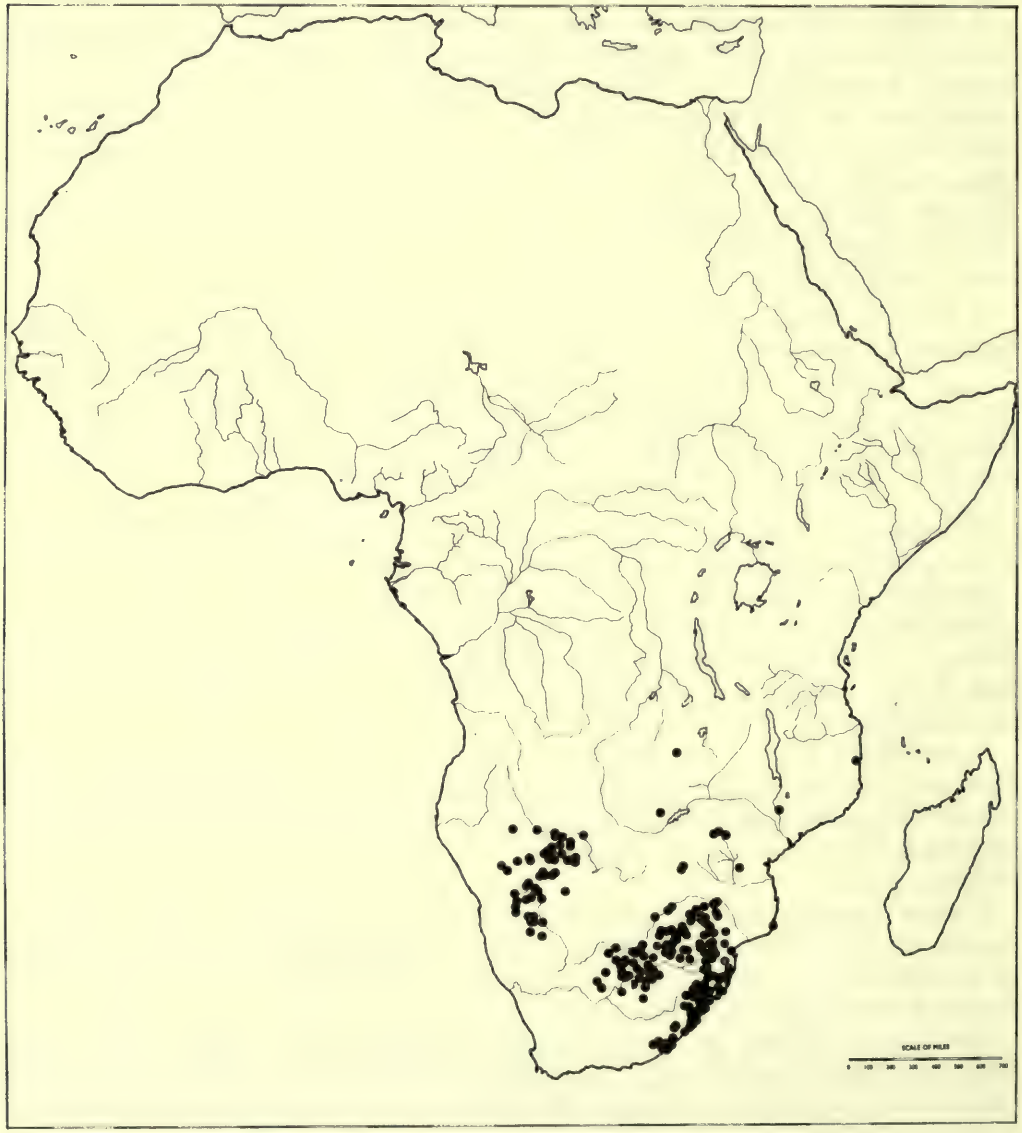
MOZAMBIQUE : Lourenço Marques, 16.xii.1918 (*Cl. Fuller*) and 14.xi.1945 (*E. H. Botha*), 11.ii.1935 (*H. Kirby*), 17.x.1952 (*W. V. Harris*), N.C.I., A.M.N.H., B.M.(N.H.) ; Inhambane, 1917 (*W. Keyes*), N.C.I. ; Porto Amelia, 1928 (*collector unknown*), Hamb.

SOUTH WEST AFRICA : Ombahowe (co-ordinates unknown), 14.x.1919 (*Hartig*), Kalidona, 100 mi. E. of Okahandja, 25,26,29,30.viii. and 3,4,5.ix., Etemba distr. Okahandja, 4 vials, 6.ix.1962 (*W. G. H. Coaton*), Rietfontein, 24.vii.1963 (*F. Gaerdes*), Windhoek, 12.iii.1964 (*J. E. Beveridge*), Rehoboth to Kalkrand, 4.x.1964 (*J. L. Sheasby*), N.C.I.

Further records from the same territory : 45 localities, 120 vials, iv.1965 to xi.1967 (*W. G. H. Coaton, G. F. Pretorius, J. L. Sheasby*), N.C.I.—These localities are all between 18° and 25° S., 16° and 21°30′ E. ; a detailed list is available at the British Museum (Natural History).

RHODESIA : Selinde Mt, 10,15.xii.1929 (*R. Boulton*), A.M.N.H. ; Melfort and Salisbury, 1950, Norton, 1951 (*G. H. Bunzli*), B.M.(N.H.) ; Bulawayo, xii.1898 (*McDonald*), Salisbury, 21.iii.1950 (*Bunzli*), N.C.I. ; Matopos, 23.xi.1965 (*M. G. Bingham*), U. Lov.

REPUBLIC OF SOUTH AFRICA : Durban, xi.1916 (*Cl. Fuller, C. P. v. d. Merwe*), type collection of *M. natalensis* var. *durbanensis* Fuller, N.C.I. ; syntypes in B.M.(N.H.) and A.M.N.H.—Other Material. Cape Province : Lusikisiki, 23.x.1956, Cathcart, 28.i.1958, Kei Mouth, 13.ix.1961 (*W. G. H. Coaton*), Harding, 17.xii.1959, Vryburg, i.1960 (*P. C. Joubert*), Mafeking, 5., Stella, 6.xii.1958 (*H. Nieman*), Kimberley, iv.1913 (*H. J. Power*), Kuruman, 7.x.1961 (*G. F. Pretorius*), Mount Frere, 15.x.1962 (*J. L. Sheasby*), N.C.I.—Natal : Port Richmond, Port Shepstone, 3.iii.1935 (*H. Kirby*), A.M.N.H. ; Weenen, no data, B.M.(N.H.) ; Pietermaritzburg, iv.1917–



Map 8. Collecting localities of *Macrotermes natalensis*.

vi.1918 (*R. Braun*), Port Natal, 23.iv.1893 (*collector unknown*), Hamb. ; Appelbosch (29°23′ S., 30°35′ E.), no date (*Ljungqvist*), Howick Falls, no date (*Trâgårdh*), Stockh.—Orange Free State : Vierfontein, 22,23.ii.1915 (*F. Thomsen*), Hertzogville, 4.viii.1961 (*J. J. C. Nel*), Bloemfontein, 28., 29., Bothaville, 29., Vredefort, 29.x.1962 (*J. L. Sheasby*), N.C.I.—Transvaal : Pretoria, 1914, 1915 (*Cl. Fuller*), N.C.I., B.M.(N.H.), Stockh. (29 more nest series in the N.C.I.) ; Johannesburg, no date (*R. Schwab*), Hamb. (2 other samples in the N.C.I.) ; Pietersburg, 15–17.iv.1935, 5 vials (*H. Kirby*), A.M.N.H. (9 other samples in the N.C.I.) ; Louis Trichardt, 25,26.xi.1916 (*Cl. Fuller*), Komatipoort, 11., 13.xi.1958, 16.xi.1959 (*P. C. Joubert*), Rustenburg, 26.ix.1961, Maraheki (24°37′ S., 27°32′ E.), 26.iv.1964 (*W. G. H. Coaton*), N.C.I.

In addition to this material, 249 nest series from 143 localities (Cape Province, 20 localities ; Natal, 53 ; Orange Free State, 7 ; Transvaal, 63) have been examined. A detailed list is available at the B.M.(N.H.) ; the samples are kept in the N.C.I.

SWAZILAND : Ezulweni (26°26′ S., 31°10′ E.), 22.ix., 17.x.1920 (*C. Buchanan*), Mbabane (26°20′ S., 31°08′ E.), 8.vi.1956, 2 vials (*J. H. Grobler*), Stegi, 23.i.1957 (*P. C. Joubert*), Balegane (26°10′ S., 31°20′ E.), 22., Piggs Peak, 23.x.1960 (*W. G. H. Coaton*), N.C.I.

A total of 551 nest series were examined.

This species is tolerant both of dry climates (some collecting localities in S.W. Africa have an annual rainfall range of 550 to 150 mm) and of cold seasons ; no other *Macrotermes* has been found in the Cape Province and the Orange Free State.

The nests have been described by Fuller (1921) and Coaton (1947) among other authors ; the reproductive imagos are usually enclosed in a distinct chamber. Swarming takes place in the second half of November, the alates emerging immediately after dark (Fuller, 1915).

Macrotermes nobilis (Sjöstedt)
(Text-figs 91–95 ; Map 9)

Termes nobilis Sjöstedt, 1900*a* : 90 ; nom. n. for *T. speciosus* Sjöstedt, 1899 : 35 [preoccupied by *T. speciosus* Haviland, 1898]. Type-locality : CAMEROON, Johann-Albrechtshöhe.

Termes (*Macrotermes*) *nobilis* Sjöstedt ; Holmgren, 1912 : 29.

Macrotermes speciosus (Sjöstedt) Sjöstedt, 1926 : 78 [unjustified restoration of preoccupied name].

Macrotermes nobilis (Sjöstedt) Snyder, 1949 : 216.

(In his last revision, Sjöstedt applied the same procedure to *M. muelleri* and to *M. speciosus ;* it was invalid for the latter, since *T. speciosus* had been well described by Haviland.)

Imago (previously undescribed). Head capsule very dark chestnut-brown. Postclypeus same colour as head, median line not conspicuous. Mandibles with reddish base, tip and inner margin black. Labrum yellowish brown. Pronotum dark sepia-brown, margins black, four light marks near anterior margin. Abdominal tergites same colour as thoracic nota, sternites lighter. Legs sepia-brown, with femora lighter than coxae and tibiae.

Head in plan view wide oval, pilosity insignificant. Fontanelle not protruding, inconspicuous, without hairs around, but with a small light dot in front of it. Eyes sub-circular, ocelli elongate, their distance from the eye equal to their major diameter. Postclypeus more than three times wider than long, not very prominent. Third antennal segment not longer than first.

Pronotum width nearly 2½ times its median length, hind margin broadly emarginate.

Measurements of the morphotype queen in millimetres :

Head width across eyes	4·13
Eye major diameter	1·18
Ocellus major diameter	0·48
Ocellus minor diameter	0·38
Ocellus ex eye	0·48
Median length of pronotum	1·70
Maximum width of pronotum	4·10
Length of hind tibia	4·76

Major soldier. Head capsule dark brown to black, with a small lighter area around fontanelle ; slightly lighter beneath, gula darker than ventral genae. Mandibles black throughout ; antennae lighter than head capsule. Thoracic nota same colour as head ; T-shaped light mark and two lateral light dots on pronotum ; mesonotum with a median light mark restricted to anterior half. Abdominal tergites sepia-brown, sternites distinctly lighter. Legs intermediate in colour between abdominal sternites and tergites.

Head in plan view trapezoidal, with very low median ridge expanding from fontanelle towards clypeus ; hyaline tip of labrum lancet-shaped ; mandibles incurved and upturned, left one barely wider than right. Antennae 18-jointed, third segment the longest. Sides of pro- and mesonotum rounded, of metanotum at right angles with hind margin, the latter faintly convex. A few scattered setae on head capsule.

Hind tibia relatively short, about 4·25 mm.

Measurements (21 specimens from 7 localities) in millimetres :

	Range	Mean
Head length	5·58–6·26	5·98
Head width	4·63–5·29	4·95
Head depth inc. gula	2·83–3·25	3·07
Length of gula	3·58–4·07	3·86
Maximum width of gula	1·27–1·43	1·33
Minimum width of gula	0·75–0·88	0·80
Length of left mandible	2·64–3·06	2·87
Length of hind tibia	3·92–4·51	4·26
Maximum length of pronotum	1·69–1·82	1·77
Maximum width of pronotum	3·04–3·35	3·23

Minor soldier. Head sepia-brown, slightly lighter beneath. Mandibles black, base same colour as head ; antennae brown, barely lighter than head. Thoracic and abdominal tergites same colour as antennae, abdominal sternites and legs lighter.

Head in plan view ovate-quadrate, in side view with convexity of gula nearly parallel to that of ventral genae ; fontanelle slightly prominent ; mandibles long and slender ; antennae 17-jointed, 3rd and 4th segment equal.

Front margin of pronotum shallowly emarginate ; metanotum c. $\frac{2}{10}$ wider than mesonotum.

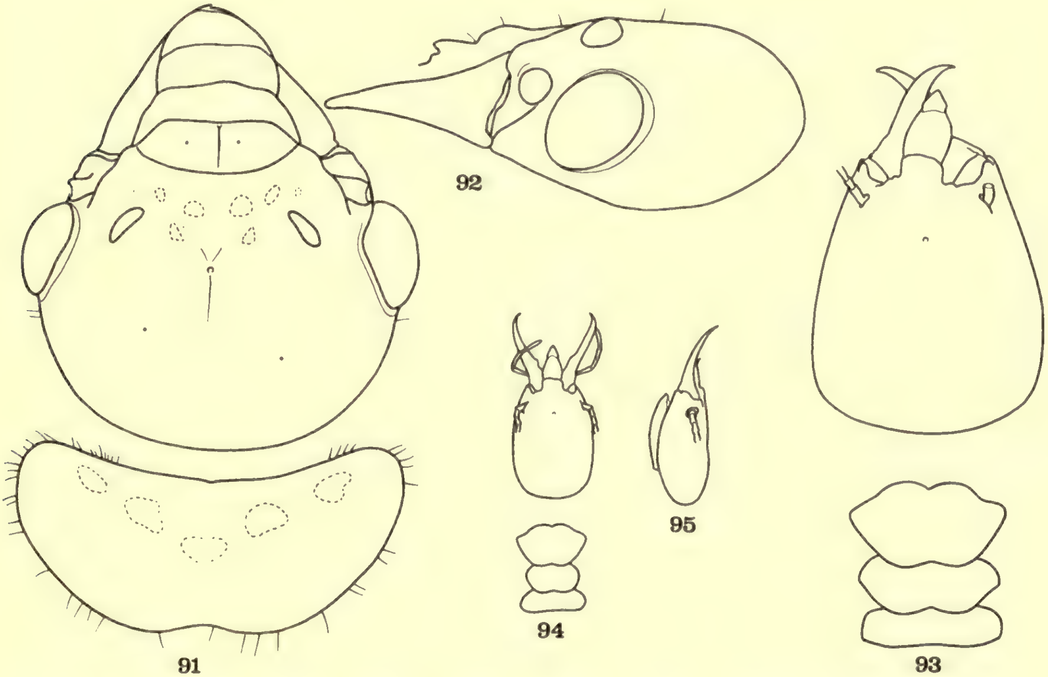
Measurements (20 specimens from 8 localities) in millimetres :

	Range	Mean
Head length	2·32–3·23	2·53
Head width	1·68–2·32	1·83
Head depth inc. gula	1·27–1·59	1·34
Length of gula	1·50–1·80	1·62
Maximum width of gula	0·63–0·72	0·66
Length of left mandible	1·64–2·57	1·82
Length of hind tibia	3·41–4·58	3·67
Maximum length of pronotum	0·95–1·14	1·04
Maximum width of pronotum	1·32–1·71	1·49

Major worker. Head same colour as minor soldier, with a conspicuous white dot around the fontanelle ; in plan view nearly semi-circular, the maximum width (19 specimens from 5 localities) : range 2·52–2·88, mean 2·65 mm.

This species is closest to *M. muelleri.* The head capsule of the imago is less elongate, the ocelli more elongate, the postclypeus proportionately wider, the third antennal joint shorter, the pronotum proportionately shorter and the index hind tibia length/head width smaller. It should be noted, however, that the truly specific differences can not be asserted before the discovery of new material. In the major soldiers, the most obvious differences between the two species are the head shape and the lengths of the left mandible and of the hind tibia. The head of *M. nobilis* is narrower and less convergent, its mandible and hind tibia are definitely shorter. In addition, the pattern of light marks on the mesonotum seems different from that found in *M. muelleri.* The minor soldiers cannot be safely recognized ; the gula in *M. nobilis* is proportionately wider than in *M. muelleri* and the difference between the widths of meso- and metanotum is smaller ; but the left mandible and the hind tibia are here unreliable as taxonomic characters.

Type Material. CAMEROON : Johann-Albrechtshöhe (4°40′ N., 9°20′ E.), 1895 (*L. Conradt*), (syntype soldiers in Berlin Museum), other syntypes in Stockh. and



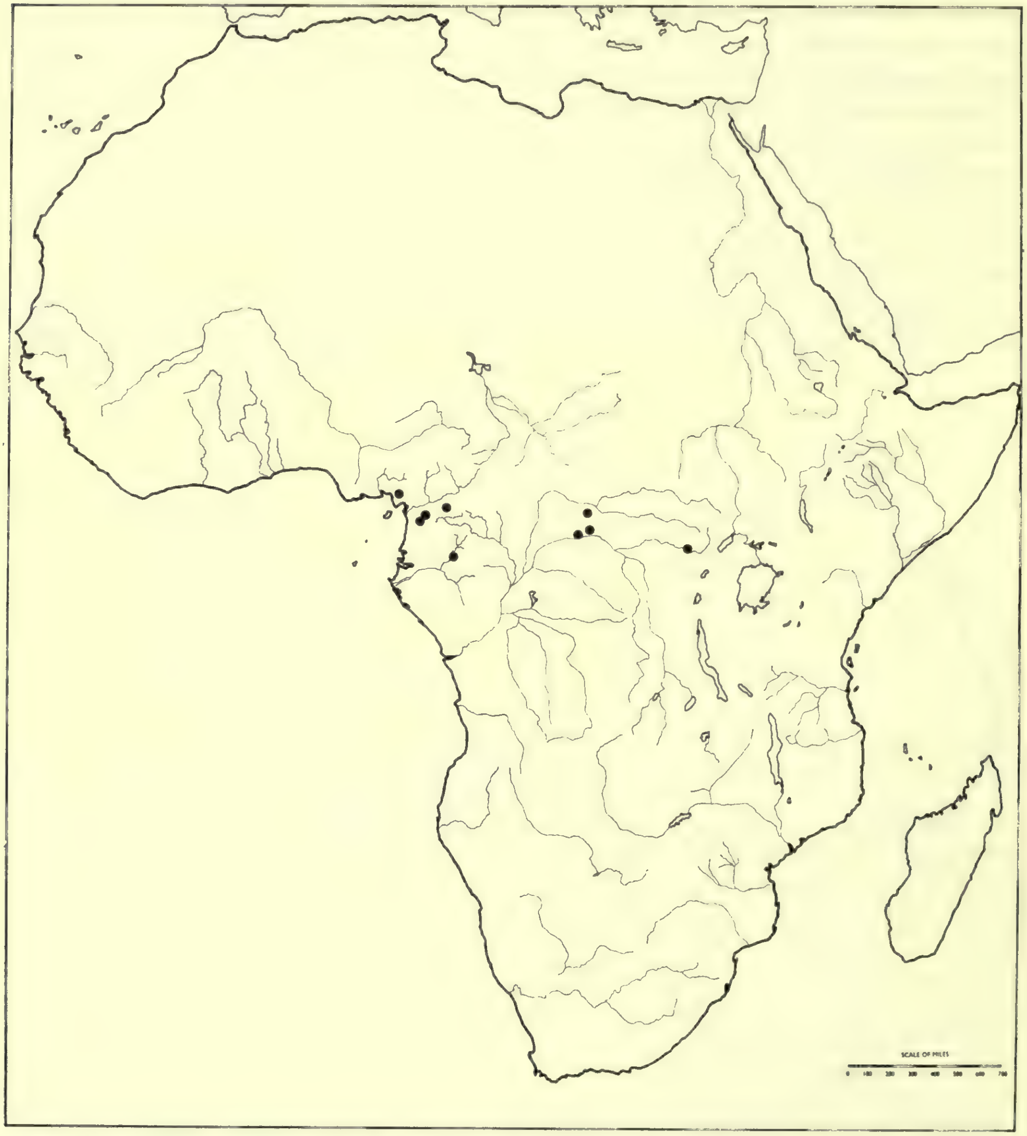
FIGS 91–95. *Macrotermes nobilis*, imago, soldiers. 91–92. Imago : 91, head capsule and pronotum, plan view (with details of light marks) ; 92, head capsule, side view. 93. Major soldier, head capsule and thoracic nota, plan view. 94–95. Minor soldier : 94, head capsule and thoracic nota, plan view ; 95, head capsule, side view.

A.M.N.H.—Morphotype imago. CONGO : Yamangi (2°25′ N., 21°50′ E.), 22.ix.1966 (*J. E. Ruelle*), U. Lov. (coll. No. VI 61) ; soldiers from same colony in B.M.(N.H.).

Other Material. CAMEROON : Lolodorf, 12.vii.–2.xii.1895 (*L. Conradt*), B.M.(N.H.), A.M.N.H. ; Bipindi, no data, A.M.N.H.

GABON : Belinga Forest nr Makokou, 29.vi.1962 (*J. Deligne*), B.M.(N.H.).

CONGO : Yalosemba (2°35′ N., 21°50′ E.), 21.ix.1966 (*J. E. Ruelle*), U. Lov.,



MAP 9. Collecting localities of *Macrotermes nobilis* ; including Ayos (3°53′ N., 12°31′ E.), after Grassé and Noirot (1951).

Terv. ; Mondongo (2°10′ N., 21°10′ E.), 28.ix.1966 (*J. E. Ruelle*), U. Lov. ; Camp Putnam (1°23′ N., 28°30′ E.), 19.v.1948, 3 vials (*A. E. Emerson*), A.M.N.H.

A total of 11 nest series were examined.

The nest structure and fungus combs of *M. nobilis* have been described from the Cameroon (Grassé & Noirot, 1951). A note by J. Deligne with his sample from Belinga Forest (Gabon) states : ' clay hummock '. Observations made while collecting the imago in a swampy area of primary forest confirm that the nests are low, dome-shaped, barely 50 cm high with a diameter exceeding 2 m ; which is strikingly different from the tall, mamillated mounds of *M. muelleri* in the same forest. (Each species has, incidentally, its own vernacular name). No distinctive queen cell was observed and the king could not be caught. The fungus combs are as figured by Grassé & Noirot (1951, Pl. II, fig. 15 [not 14]).

Macrotermes subhyalinus (Rambur) **sp. rev.**

(Text-figs 96–122 ; Map 10)

Termes subhyalinus Rambur, 1842 : 307. Type-locality : SENEGAL.

Termes bellicosus Smeathman ; Hagen, 1858 : 109 [misidentification].

Termes bellicosus subsp. *sansibarita* Wasmann, 1897 : 158. Type-locality : ZANZIBAR [syn. *M. subhyalinus* (as *T. bellicosus*), Sjöstedt, 1900 : 100].

Termes tumulicola Sjöstedt, 1899 : 34. Type-locality : DAHOMEY, Gross Popo, **syn. n.**

Bellicositermes jeanneli Grassé, 1937 : 71. Type-locality : KENYA, Kalodeka [syn. *M. subhyalinus* (as *B. bellicosus*) Grassé & Noirot, 1961 : 323].

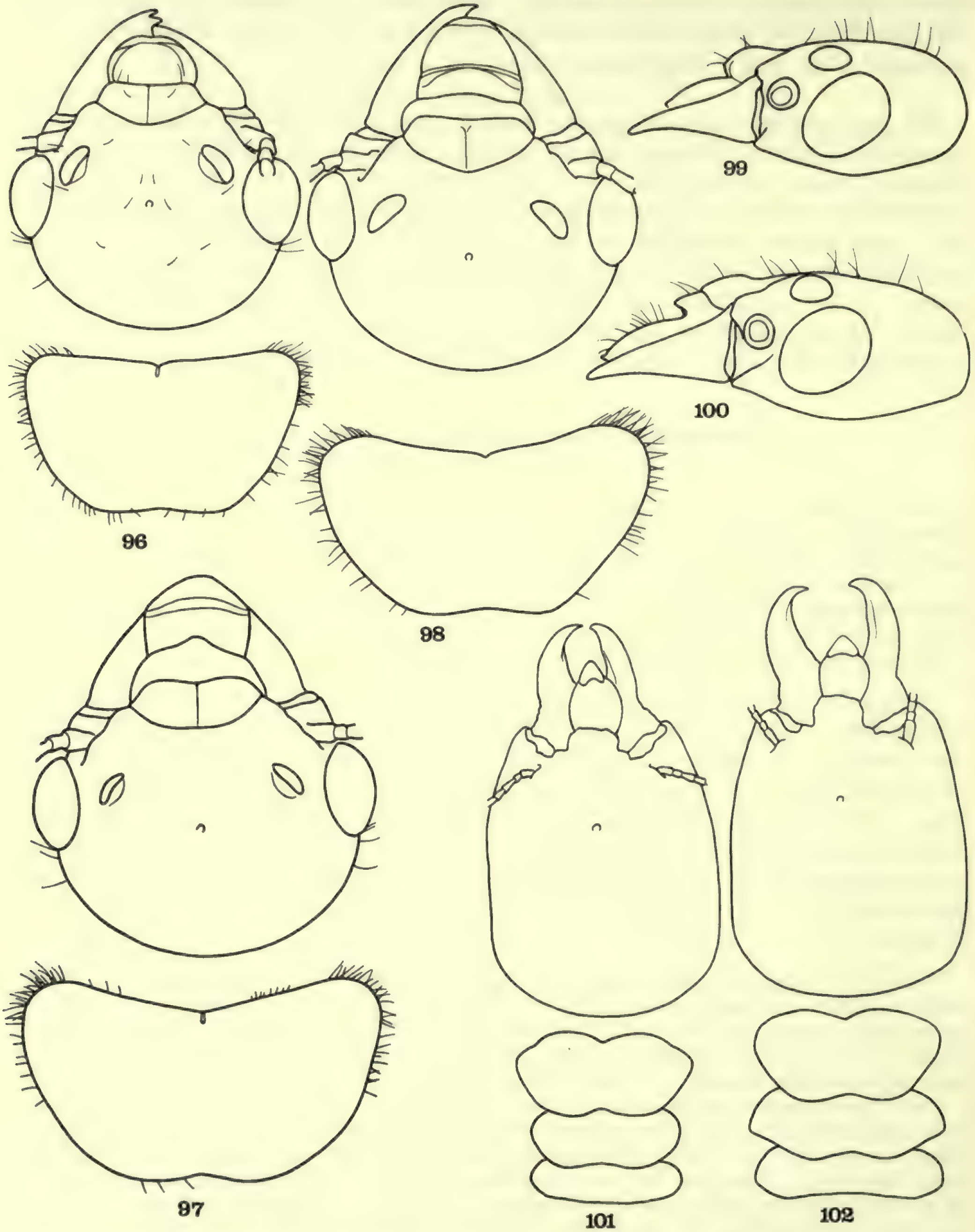
As with *M. bellicosus*, the above synonymy contains only entries of nomenclatural significance. To list all the misidentifications that have followed Hagen's publication would be beyond the scope of this revision. Suffice it here to quote some taxonomic papers (Silvestri, 1914 : 12, under the name of *goliath* ; Grassé, 1937*a*, 1944 ; Harris, 1936, 1948, 1957, 1963 ; Weidner, 1956, 1961), and to state that any citation of the species-name *bellicosus* under the generic headings of *Amplitermes*, *Bellicositermes* or *Macrotermes* in the literature and not included in the material examined or in the references cited in this revision, should be referred to *M. subhyalinus*.

Neotype, ♂ *imago*. Head capsule chestnut-brown ; postclypeus lighter than head, with a thin, dark, not very conspicuous median line. Pronotum same colour as head, a light T-shaped mark in the middle and two light dots near the antero-lateral corners ; abdominal tergites same colour as pronotum, sternites lighter. Legs less reddish-tinged than head capsule, tibiae slightly darker than femora. Wings yellowish brown.

Head capsule in plan view showing a distinctly depressed, semi-circular area around fontanelle ; fontanelle itself protruding, surrounded by short setae, followed anteriorly by a narrow median ridge towards clypeus ; in side view vertex of head capsule evenly convex, rather than hog-backed (opp. *bellicosus*). Eyes big, not very prominent, rounded. Ocelli slightly elongate, distant from the eye by about $\frac{1}{3}$ of their major diameter. Postclypeus moderately inflated. Antennae (in other specimens than the neotype) 19-jointed, 3rd segment the longest, 2nd and 4th equal.

Front margin of pronotum convex, hind margin weakly concave, antero-lateral corners acute.

Measurements in millimetres : neotype—range and mean of 145 specimens from 63 localities :



Figs 96–102. *Macrotermes subhyalinus*, imago, major soldier. 96–100. Imago : 96–98, head capsule and pronotum, plan view ; 99–100, head capsule, side view. 101–102. Major soldier : head capsule and thoracic nota, plan view.

	Neotype	Range	Mean
Head width across eyes	3·42	3·12–3·96	3·48
Eye major diameter	1·22	1·00–1·36	1·17
Ocellus major diameter	0·49	0·36–0·67	0·50
Ocellus minor diameter	0·33	0·27–0·46	0·35
Ocellus ex eye	0·16	0·08–0·35	0·19
Median length of pronotum	1·75	1·64–2·02	1·83
Maximum width of pronotum	3·15	2·95–4·13	3·40
Length of hind tibia	4·80	4·18–5·29	4·69
Length of fore wing	32·00	29·00–43·00	36·40
Maximum width of fore wing	9·00	8·00–10·50	9·30

Major soldier. Head red-yellow to reddish brown, usually lighter beneath, sides of gula darker than ventral genae. Antennae darker than head capsule. Mandibles black with reddish base. Thoracic nota : margins dark brown, centre yellowish brown. Rest of body same colour as thorax, but abdominal sternites lighter than tergites and tibiae darker than femora.

Head capsule in plan view rectangular, slightly narrowed in front, with two grooves from the fontanelle to the articulations of the mandibles ; in side view, rather thick, forehead more or less truncated. Mandibles stout, left one slightly wider and more incurved than right, its length very nearly equal to head depth. Pilosity scattered, a little denser on gula. Sides of hyaline tip of labrum usually convex. Antennae 17-jointed, 3rd segment about twice the 2nd.

Pronotum large, its length more than half its width, front and hind margin equally emarginate, lateral corners rounded, setae longer than on head capsule ; mesonotum a little narrower than pronotum ; metanotum more often than not narrower than mesonotum, its hind margin flat to concave. The three nota well sclerotized.

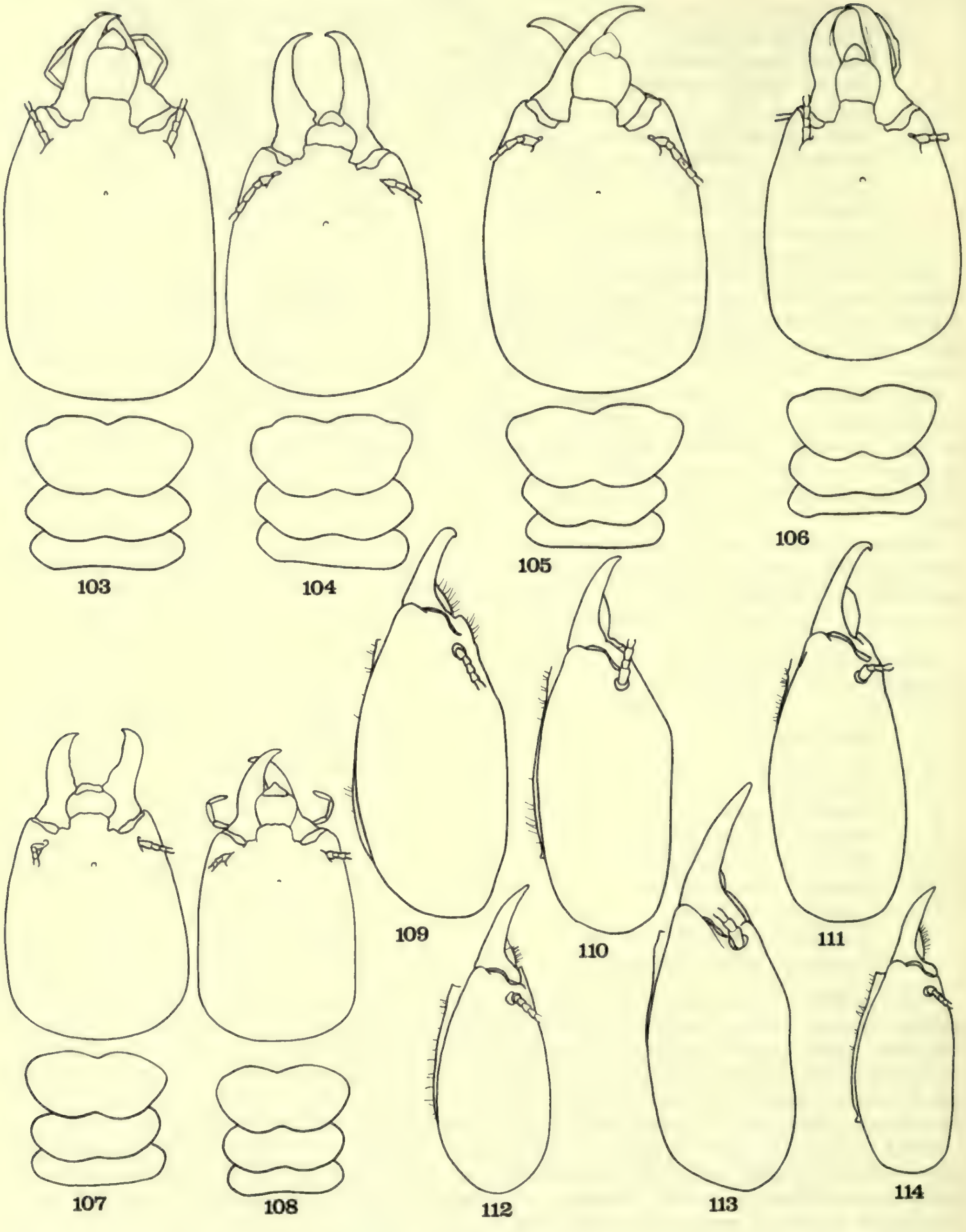
Measurements in millimetres : morphotype (only a head capsule)—range and mean of 456 specimens from 163 localities :

	Morphotype	Range	Mean
Head length	6·36	4·84–7·70	6·49
Head width	4·90	3·48–6·45	4·98
Head depth inc. gula	3·15	2·41–4·13	3·20
Length of gula	—	3·23–4·90	4·27
Maximum width of gula	—	1·21–1·68	1·48
Minimum width of gula	—	0·89–1·36	1·11
Length of left mandible	3·10	2·37–3·72	3·23
Length of hind tibia	—	2·69–4·58	3·75
Maximum length of pronotum	—	1·50–2·52	1·97
Maximum width of pronotum	—	2·91–4·57	3·83

Minor soldier. Head capsule yellowish brown to chestnut-brown, lighter than that of major soldier, anterior outline darker, especially between antennal sockets and upper mandibular condyles ; gula darker than genae. Mandibles black, base dark red. Antennae smoky brown, darker than head. Thorax darker or lighter than head capsule, the outline of the nota being usually darker than the middle. Abdominal sternites same colour as tergites and lighter than the thorax. Femora and tibiae same colour as abdomen (tibiae often darker), tarsi darker.

Head in plan view quadrate-elongate, sides nearly straight. Fontanelle usually conspicuous, sometimes protruding and followed anteriorly by a faint median ridge. Mandibles slender, incurved and a little upcurved. Pilosity very sparse on head capsule, somewhat more abundant on labrum and body, setae darker than cuticle. Inner margin of left mandible not serrate.

Pronotum with sides fairly straight from rounded antero-lateral corners to hind margin ; both front and hind margins emarginate. Sides of meso- and metanotum rounded, the latter slightly wider than the former.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Figs 103–114. *Macrotermes subhyalinus*, major soldier. 103–108, head capsule and thoracic nota, plan view ; 109–114, head capsule, side view.

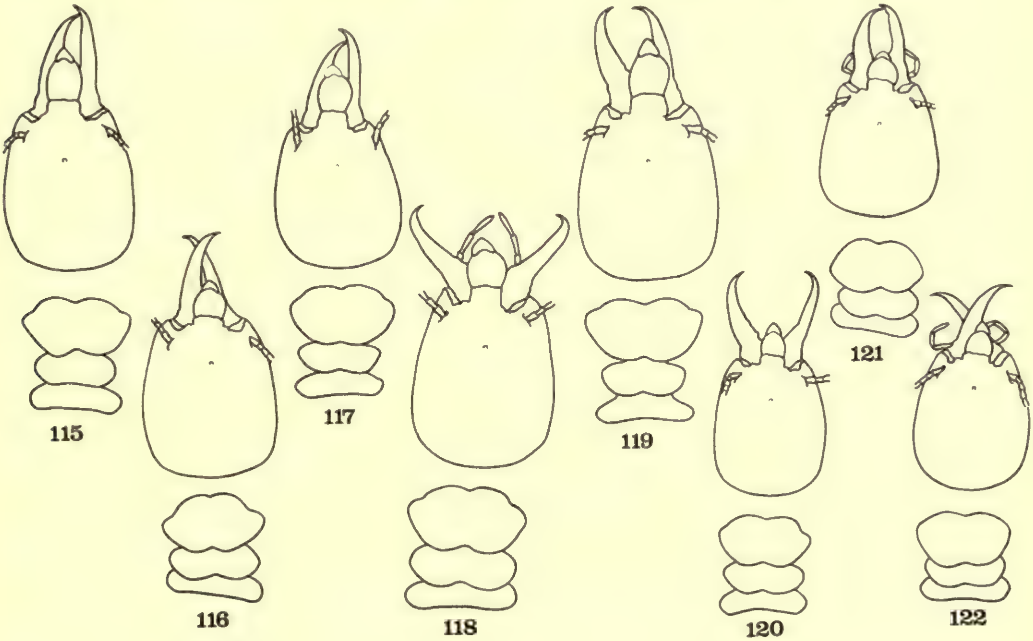
Measurements (439 specimens from 146 localities) in millimetres :

	Range	Mean
Head length	2·67–4·45	3·57
Head width	2·31–3·55	2·87
Head depth inc. gula	1·52–2·24	1·87
Length of gula	1·81–2·66	2·32
Maximum width of gula	0·81–1·01	0·92
Length of left mandible	1·85–2·90	2·41
Length of hind tibia	2·19–3·35	2·78
Maximum length of pronotum	1·04–1·55	1·33
Maximum width of pronotum	1·86–2·75	2·36

Major worker. Head capsule rich chestnut-brown ; in plan view, sides slightly convex, posterior margin rounded (Text-fig. 22). Head width (335 specimens from 114 localities) : range 2·18–3·27, mean 2·75 mm.

Variation. The imagos are smaller in West Africa (head width, 3·15–3·45 mm) than in East Africa (3·30–3·87), the specimens from Central Africa being intermediate ; the wings, in this last sub-region, are longer : 35·0–40·0 mm (East : 30·0–43·0, this upper limit being exceptional ; West : 29·0–35·0). No variation clines in coloration or pilosity could be determined. The sculpturing of the head capsule as it appears in plan or oblique view is one of the most constant characters. No imagos were available from South-West Africa.

The largest major soldiers have been found in Central Africa, the smallest in South-West Africa (mean head length of 28 specimens from this sub-region, 5·55 mm). The index head depth/length of left mandible is more often inferior to 1 in Central Africa (80% of the specimens) than elsewhere (West and East Africa, 40%) : in other words, the head capsule appears flatter and/or the left mandible longer in Central Africa. In 182 randomly selected specimens from



Figs 115–122. *Macrotermes subhyalinus*, minor soldier, head capsule and thoracic nota, plan view.

82 localities, the index mesonotum width/metanotum width has been found greater than 1 in 115 cases : in other words, the mesonotum is often, not 'nearly always' wider than the metanotum (Grassé & Noirot, 1961). There are likewise many exceptions to the character 'hind margin of metanotum not concave'.

The largest minor soldiers have also been found in Central Africa, but they are only slightly larger than those of West Africa.

The imagos of *M. subhyalinus* usually have longer but fewer setae on the head capsule than those of *M. bellicosus* ; the T-shaped mark on the pronotum is often more conspicuous and the ocelli are bigger and more elongate ; the major soldiers of both species can be recognized by the overall size, the sculpturing of the forehead and the thoracic nota ; the minor soldiers mainly by the size and the left mandible ; the major workers by head shape and colour. The imagos of *M. falciger*, usually larger than those of *M. subhyalinus*, have proportionately smaller eyes and longer tibiae, the depressed area around the fontanelle also differs in shape ; major soldiers of *falciger* are usually darker and are furthermore characterized by their huge thoracic nota, their wide head, thick antennae and conspicuous pilosity of the gula ; the minor soldiers have longer tibiae and more incurved mandibles. The case of *M. mossambicus* has already been discussed.

The identification of specimens from some collecting areas : Ubangi–Uele–Uganda (*bellicosus*), Katanga–Zambia (*falciger*), South-West Africa (*mossambicus*), where *M. subhyalinus* has been found with the species given in brackets, can still be difficult. In the absence of any reliable evidence of inter-specific hybridization, this is attributed to the specific variability.

While meaning to complete Smeathman's description, Hagen (1855–1858) mistook specimens of *M. subhyalinus* for *M. bellicosus*. Most of the material examined by him—notably the Imhoff collection—has not been found in the European institutions ; but some of Rambur's and Latreille's specimens that had been passed to the Selys Longchamps collection (Desneux, 1915) were studied at the I.R.S.N., Bruxelles. The next available name for the species described by Hagen was *T. subhyalinus* Rambur (not *T. capensis* Latreille, 1804, since the latter author, mistakenly quoted by Snyder (1949 : 209), was not describing a new species). The holotype has been lost, but the only other *Macrotermes* from the same country in the same collection belong to that species : hence the neotype and morphotype that have been selected and are listed below.

Types or syntypes of *T. tumulicola* Sjöstedt and *Bellicositermes bellicosus* var. *rex* Grassé & Noirot have also been examined.

Type Material. NEOTYPE. SENEGAL : locality illegible, coll. No. 5, male imago. Morphotype : coll. No. 27, head capsule of major soldier. Both at the Institut Royal des Sciences Naturelles, Bruxelles.

Other Material. SENEGAL : Cayor (15°05′ N., 16°30′ W.), v.1895 (*Chaper*), Stockh. ; Thiès, 26.ix.1912 (*F. Silvestri*), (Silvestri collection, Portici) and A.M.N.H.

GAMBIA : Abuko (13°24′ N., 16°39′ W.), 10.ix.1966 (*W. A. Sands*).

PORTUGUESE GUINEA : Bissâo, 1896 (*H. Traun*), Hamb. and Stockh.

GUINEA : Conakry, 30.xi.1892 (*H. Brauns*), no date (*Chevalier*), 8.viii.1912 (*F. Silvestri*), Hamb., Stockh., (Silvestri coll., Portici) and A.M.N.H. ; Kindia, date not recorded (*F. Silvestri*), (Silv. coll., Port.) and A.M.N.H. ; Los Islands, no date (*Serand*), Stockh.

SIERRA LEONE : Njala (8°06′ N., 12°05′ W.), 14.iv.1928 (*H. Hargreaves*), 24.viii. 1930 (*E. Hargreaves*), 24.ii.1947 (*F. A. Squire*), 25.–29.i.1955 (*W. V. Harris*), A.M.N.H., B.M.(N.H.), N.C.I.

MALI : Kayes, no date (*Mineur*), Stockh.

IVORY COAST : Adiopodoumé (5°20′ N., 4°08′ W.), 8.vi.1952 (*collector unknown*), 45 km N. of Séguéla, no date (*M. Lüscher*), A.M.N.H.

GHANA : Peki (6°33′ N., 1°41′ W.), i.1927 (*G. S. Cotterell*), A.M.N.H. ; Ho, 1892 (*Rossmann*), Sekondi, 6.iv.1911 (*C. Manger*), Hamb. ; Accra, no date and 8.vi.1926 (*A. W. J. Pomeroy*), 30 mi. N.E. of Accra, iii.1958 (*R. Hamilton*), 28 m. fr. Tamale on Bolgatanga Rd, 1., 35 m. fr. Tamale on Yendi Rd, 4., 20 m. fr. Bolgatanga on Bawku Rd, 8., 9 m. fr. Bolgatanga on Navrongo Rd, 9., 29 m. fr. Navrongo on Tumu Rd, 13., Paga, 14., 9 mi. N. of Lawra on Nandom Rd, 18., 6 mi. N. of Wa on Lawra Rd, 19.iii.1959 (*W. A. Sands*).

TOGO : Anécho, 21.x.1893 (*H. O. Schmidt*), Hamb. and Stockh. ; Noepe, 15.xi.1905 (*M. Otto*), Misahöhe, 29.xi.1910 (*collector unknown*), Hamb.

DAHOMEY : Gross Popo (6°19′ N., 1°57′ E.), 23.ii.1897 (*F. Martinsen*), type collection of *T. tumulicola* Sj., Hamb.

NIGERIA : Western Region : Akure, 11.iii.1933 (*D. P. W.*), A.M.N.H. ; Agega (? 6°40′ N., 3°20′ E.), 9.i.1912 (*E. Ballard*), Ikoyi, ? 1934 (*collector unknown*), Olokemeje, 8., Agodi (Ibadan), 10.xii.1957 (*W. A. Sands*), Akure, 20.x.1956, Lagos, 25.xi.1957 (*W. Wilkinson*). Eastern Region : Okigwi, 1955 (*B. J. MacNulty*), 47 m. fr. Enugu on Onitsha Rd, 31.i.1957 (*W. Wilkinson*). Northern Region : Birnin Kebbi, 12.vii.1959 (*Kuhlow*), Hamb. ; Sokoto, no date (*Gaillard*), Stockh. ; 43 mi. E. of Kano, Gaya R., 17., 25 m. fr. Sokoto on Gusau Rd, 25., 35 mi. N. of Sokoto on Illela Rd, 26.xi., 27 m. fr. Zungeru, 19., 15 m. fr. Kaduna R. on Mokwa–Bida Rd, 22., 12 m. fr. Abuja on Minna Rd, 29.xii.1956, 5 m. fr. Jos on Bykuru Rd, 6., Bauchi, 12., Afaka Forest Reserve (10°30′ N., 7°0′ E.), 28.ii., Kwei 4 mi. W. of Jos–Panshin Rd near Heipang, 29.iii., Gombe, 9., 18 m. fr. Yola on Numan Rd, 14., 34 m. fr. Yola on Jalingo Rd, 14., Yola–Faro R. 0·5 m. fr. Faro R., 15., Tiba–Gangoro, 25., 35 m. fr. Yola on Biu Rd, 28., 15 mi. N. of Biu on Damaturu Rd, 29.v., Wulgo on L. Chad, 2., 50 m. fr. Maiduguri on Ft Lamy Rd, 3.vi.1957, Gboko, 26.ii.1958 (*W. A. Sands*).

CENTRAL AFRICAN REPUBLIC : Bossembélé, 10.vi.1948 (*Grassé & Noirot*), type collection of *B. bellicosus* var. *rex* Gr.-N., (own collection) and A.M.N.H. ; Lobaye (3°40′ N., 18°0′ E.), 1965 (*J. M. Pasteels*), own collection ; Bania, Nola, no date (*G. Eriksson*), Stockh. ; Zemio, 5 and 7.iii., Bombo (4°50′ N., 22°30′ E.), 10.iii., Bangassou, 12.iii.1948 (*N. A. Weber*), A.M.N.H.

CONGO : Luebo, ix.1921 (*H. Schouteden*), Terv., Stockh. and A.M.N.H. ; Niangara, xi.1920 (*Lang-Chapin*), 1931 (*coll. unknown*), Terv., A.M.N.H., N.C.I. ; Luluabourg, 20.xii., 3 vials, 21.xii.1913, 2 vials, 22.xi.1921, 6 vials (*P. Callewaert*), 10.iii.–20.iv.1939, 7 vials (*J. J. Deheyn*), Lubumbashi (ex : Elisabethville), 1921 (*Poppe*), ix.1921 (*Devroye*), Luanza, xi.1912 (*de Paoli*), Terv., Stockh. ; L. Nyanza, no date, Mauda (4°05′ N., 27°41′ E.), 2.iv., Mahagi, 10 and 23.v.1925 (*H. Schouteden*), Ishwa (2°12′ N., 31°10′ E.), 20.ix.1934, Kasenye, 7.v.1935 (*H. J. Brédo*), Watsa, vii.1920, Tora, 16.v.1926 (*L. Burgeon*), Abok (2°16′ N., 30°59′ E.), no date, Niarembe (2°14′ N., 31°07′ E.), 7.v.1935 (*Ch. Scops*), Albertville, 1928 (*Lejeune*), Bambesa (3°23′ N., 25°47′ E.), 14.iv.1937 (*Vrijdagh*), Doruma, 1927 (*J. Walkiers*), Irumu, vii.1937 (*J. Ghesquière*), Kanda-Kanda, 1935 (*Luxen*), Kanzenze, viii.1931 (*G. F. De Witte*), Kasongo, no date (*Van Diest*), Kiabukwa, 3.iv.1932 (*P. Quarré*), Luashi, iii.1936 (*Freyne*), Nyangwe, iv.1924 (*J. Henrard*), Ukesere (1°55′ N., 30°32′ E.), 21.ii.1929 (*A. Collart*), Van Kerkhovenville (3°21′ N., 29°32′ E.), no date, 2 vials (*De Greeff*), Terv. ; Kinda, no date (*Müller*), I.R.S.N. ; Garamba (4°10′ N., 29°40′ E.), no date (*Lang-Chapin*), Uele–Bomokandi Junction (= Bambili), 2.ii., Bunia, ii.–iii.1948 (*N. A. Weber*), A.M.N.H. ; Kamina, 20.xii.1959 (*A. Bouillon*), Katanda (6°23′ S., 23°55′ E.), 27.vii.1963 (*J. E. Ruelle*), U. Lov.

SUDAN : Torit, 5.viii.1962 (*H. Schmutterer*), no date (*Weber* Coll. No. 1461), Hamb., A.M.N.H. ; Tozi (12°40′ N., 33°50′ E.), 5.vii.1959 and 1., 2.x.1960, Dumo (10° N., 25°30′ E.), 29.xii.1959, Yei, 6.vii., Tash (11°30′ N., 30° E.), 1.xi.1962 (*H. Schmutterer*), Hamb. ; Khor el Affin, no date, 3 vials (*Ebner*), Stockh. ; Imatong Mts, 24.vii.1939 (*N. A. Weber*), Kagelu, 14.iv., Azza Forest (12° N., 37° E.), Bangenze Mt, ? v., Hokwa (5°09′ N., 28°41′ E.), 14., 2 vials, Ibba, 23.v.1937 (*J. G. Myers*), A.M.N.H. ; Geneina, 26.iii.1927 (*Evans*), Li Yubu (Zande Distr.), vi.1948 (*G. M. Culwick*), L. Keilak, 30.vi.1952 (*C. Sweeney*).

CHAD : Ennedi Mts, x.1957 (*Brit. Ennedi Expedit.*).

ETHIOPIA : Boutta (? Butta Mts, 7° N., 37° E.), no date (*Rothschild*), Stockh. ; Gula R. (15°35′ N., 38°25′ E.), no date, Moyale, and N. of Mega, xi.1943 (*Buxton*).

SOMALI REPUBLIC : Abruzzi, no date (*G. Paoli*), 1930 (*G. Russo*), A.M.N.H., N.C.I. ; Halaya (9°34′ N., 44°08′ E.), 20.iii., Lanmulaho (8°36′ N., 45°13′ E.), 13.vii.1946 (*P. E. Glover*).

WESTERN ADEN PROTECTORATE : Dhala, 14.ix., Jebel Jihaf, 20.ix., Jebel Harir, 30.x.1937 (*H. Scott, E. B. Britton*), Habban–Yeshbum Rd Junction, 1.xii.1951 (*W. V. Harris*).

UGANDA : Bugala Isl., no date (*Bayon*), Stockh. ; Bugiri, 5.–8.viii.1957 (*P. Basilewsky* and *N. Leleup*), Terv. ; Masaka, 1925 (*L. R. Hancock*), 20 m. fr. Kampala tow. Entebbe, 11.xii.1934 (*H. Kirby*), Bunyoro (Butiaba), Gulu, Bweramule (Toro tribe), West Nile Region, no dates, 4 vials (*D. R. Buxton*), A.M.N.H. ; Katwe, no date recorded, Kikundwa (1°25′ N., 31°22′ E.), 1946, Kawanda (0°20′ N., 32°30′ E.), 21.v.1949, Serere, x.1949, Mbarara, 14.xi.1949 (*W. V. Harris*).

KENYA : Kalodeka (2°20′ N., 35°50′ E.), 20.i.1933 (*R. Jeannel*), type-colony of *B. jeanneli* Grassé, (own collection), syntypes in A.M.N.H. Other Material : Lumbwa, no date (*Sandberg*), Guaso Nyiro (? Waso), 19.ii.1911 (*E. Lönnberg*), Stockh. ; Turkana Distr., no date (*D. R. Buxton*), Ruiru, 20.xi., 26 mi. W. of Nakuru, 5.xii.1934, Namanga R., 4., Taveta Forest, 25., Mombasa, 30.i.1935 (*H. Kirby*), A.M.N.H. ; Rumuruti, 8.x.1950 (*W. V. Harris*), Kalodeka (as above), iv.1951 (*B. F. F. Harrison*), Meru, x.1952 (*W. A. Sands*), Kitui District, 1954 (*Heisch*).

RWANDA : Kigali, 1933 (*Van Assche*), Terv. ; Bugesera (2°05′ S., 30°20′ E.), 13.–17.xi.1963, 8 vials (*A. Bouillon*), U. Lov.

BURUNDI : Kitega, x.1935 (*P. Lefèvre*), Muhinga, 1938 (*Smets*), Terv.

TANZANIA : Kokotoni (Zanzibar), 12.viii.1889 (*A. Voeltzkow*), type collection of *T. bellicosus* subsp. *sansibarita* Wasmann, Stockh., syntypes in A.M.N.H. ; Zanzibar, no dates (*Stuhlmann, Aders, collector unknown*), Stockh., I.R.S.N., B.M.(N.H.) ; Tanga, no date (*v. Reden*), 8.v.1935 (*W. Dethleffsen*), Stockh., Hamb. ; Himo, 1., 5.xi.1934 (*H. Kirby*), 18.vii.1957 (*P. Basilewsky* and *N. Leleup*), A.M.N.H., Terv. ; Amani, 1908 (*Oberleutnant von Puttkamer*), 1.x.1934 (*H. Kirby*), Hamb., A.M.N.H. ; Shinyanga, 10.vi.1932 (*collector unknown*), N.C.I. and A.M.N.H. ; Funzi Isl., 20.iii.1903 (*A. Voeltzkow*), Moshi, 23.x., 1.–4.xi.1934, 6 vials, Dodoma, 22., Babati, 23.i.1935 (*H. Kirby*), A.M.N.H. ; Kisarawe, 1903 (*F. Eichelbaum*), Hamb. ; Karema, no date (*Storms*), I.R.S.N. ; Kibongoto, no date (*Sjöstedt*), Stockh. ; Longido, 17., 20.iv.1957 (*P. Basilewsky* and *N. Leleup*), Terv. ; Dar-es-Salaam, 15.vi.1916 (*A. Loveridge*), Rift Valley, 1934 (*coll. unknown*), Same, 24.ii.1951 (*H. M.*), Tabora, no date (*A. Lindeman*), 23.viii.1936 (*W. V. Harris*), vi.1952 (*P. R. Hesse*), Bukoba–L. Ikimba, no date recorded, Kalambo R., 23.x.1933, Tengeru, 31.viii.1950 (*W. V. Harris*).

ANGOLA : Cazombo, 10.ii.1955 (*A. de Barros Machado*), (Dundo) and Hamb. ; Dundo, no date recorded (*A. de B. M.*), (Dundo) and U. Lov. ; Luisavo Falls (11°50′ S., 23°35′ E.), 23.ii.1955 (*Luna de Carvalho*), Dundo; Perdiva, 30 mi. E. of Pt Alexandre, no data, B.M.(N.H.).

ZAMBIA : N'Changa, no date (*C. T. Macnamara*), Lusaka, no data, and 17.viii.1949 (*Hope-Simpson*), B.M.(N.H.) ; Choma, 10., 12., 14.i.1957 (*W. G. H. Coaton*), N.C.I. ; Lusaka, 9.viii., 12.xii.1966 (*M. G. Bingham*), U. Lov.

MALAWI : Zomba, no date (*H. H. Johnston*), 24 m. fr. Ngabu on Chiromo Rd, 15., 9 m. fr. Ft Johnston on Farringdon Rd, 25.viii., Bua R., 17.ix.1953 (*W. A. Sands* and *W. Wilkinson*).

MOZAMBIQUE : Guengire (19°01′ S., 34°19′ E.), no date (*Vasse*), Stockh.

SOUTH WEST AFRICA : 40 mi. N. W. of Okahandja, 24.ii., Swartbooisdrift (17°21′ S., 13°51′ E.), 18.x.1963 (*F. Gaerdes*), N.C.I.

In addition to those, exactly 90 nest series collected by *W. G. H. Coaton*, *G. F. Pretorius* and *J. L. Sheasby* between September 1965 and October 1966 have been identified as *M. subhyalinus*. They are kept in the N.C.I., Pretoria. A detailed list of the 24 localities involved is available at the B.M.(N.H.) ; the following, however, should be cited here : Epupa Falls (17° S., 13°20′ E.), Ohopoho, Ombombo, Fransfontein, Omaruru, Andara.

RHODESIA : Rekomitjie (16°07′ S., 29°23′ E.), 14.x.1964 (*M. G. Bingham*), B.M.(N.H.) and U. Lov. ; Mkwichi (16°17′ S., 30° E.), Chenanga (16°29′ S., 30°14′ E.), x.1965 (*M. G. B.*), U. Lov.

A total of 412 nest series were examined and, when no other indication is given, the material is in the B.M.(N.H.).

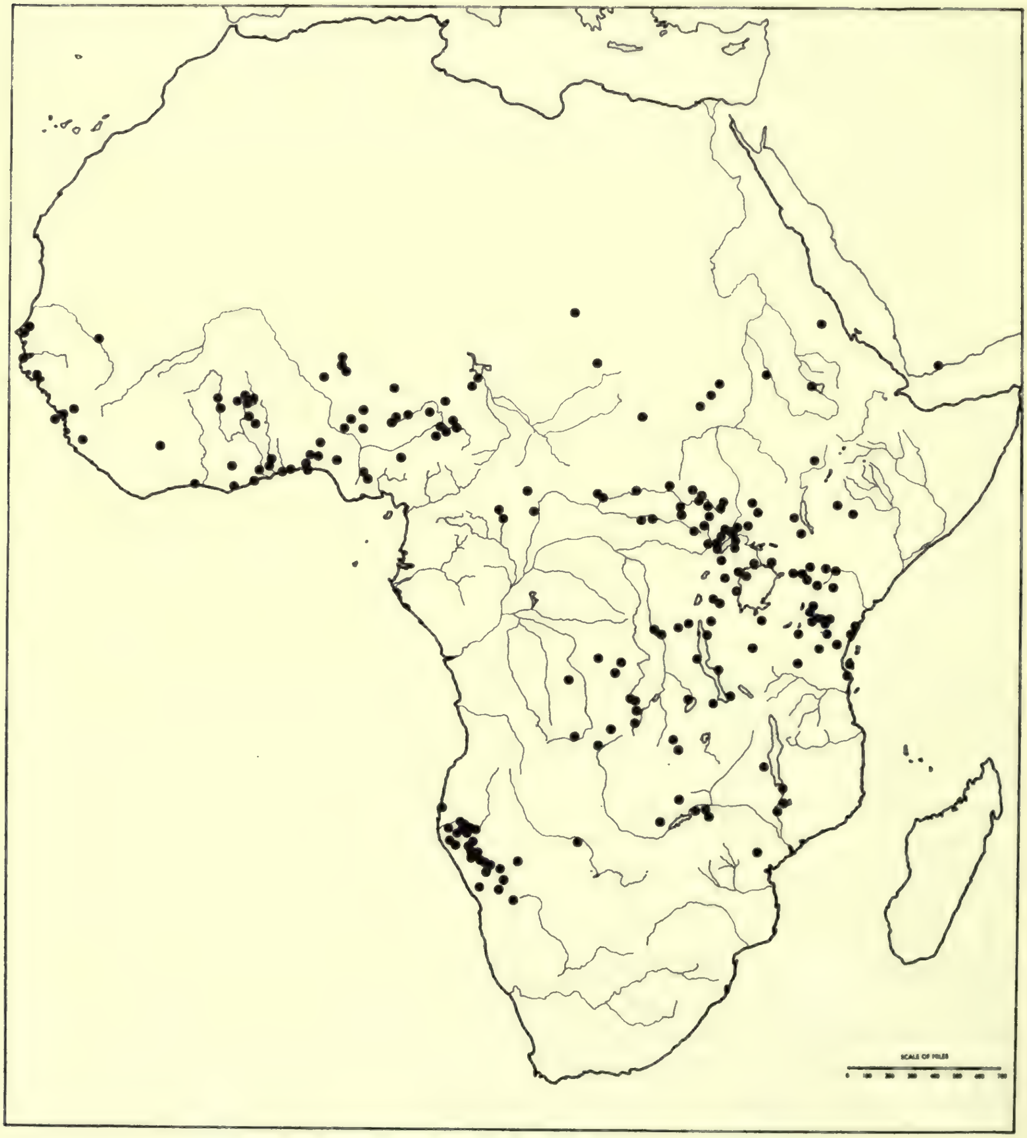
Under the name of ' *bellicosus* ', the nest structure of this species has been studied and its mounds figured from a variety of places : West and Central Africa (Grassé, 1937*a*, 1944 ; Grassé & Noirot, 1961), East Africa (Harris, 1956, 1961), Angola (Weidner, 1961), to quote only recent literature and reliable determinations.

From the collecting data accompanying the samples, some dates of swarming may be mentioned : Adiopodoumé (Ivory Coast), 8.vi.1952 ; Luluabourg (Congo)

22.xi.1921, two days after rain and 20 minutes after moonrise ; Kawanda (Uganda), 21.v.1949, night ; Lusaka (Zambia), 12.xii.1966, at midnight.

Macrotermes ukuzii Fuller
(Text-figs 123–132 ; Map 11)

Termes (*Termes*) *parvus* Holmgren, 1913 : 325. Type-locality : REPUBLIC OF SOUTH AFRICA, Zululand [junior primary homonym of *T. parvus* Haviland, 1898].



MAP 10. Collecting localities of *Macrotermes subhyalinus*.

Macrotermes ukuzii Fuller, 1922 : 80. Type-locality : Republic of South Africa, Ukuzi [= Mkuzi] R.

Macrotermes bellicosus var. *ukuzii* Fuller, 1927 : 139 [erroneous reduction to subspecies].

Imago (previously undescribed). Head capsule light chestnut-brown, with four light dots between fontanelle, ocelli and postclypeus ; postclypeus lighter than head, with conspicuous dark median line. Margins of pronotum darker than head, central area lighter without sharply defined pattern of marks or dots. Abdominal tergites same colour as thorax, sternites lighter. Tibiae darker than femora. Wings smoky yellow.

Head capsule in plan view slightly elongate ; fontanelle protruding from a depression, followed anteriorly by a median ridge which is lower than the fontanellar hump. Eyes broadly oval and proportionately large ; ocelli wide, distant from the eye by ⅓ of their major diameter. Postclypeus narrow, moderately inflated. Antennae 19-jointed, 3rd segment barely longer than 2nd. Quite a few bristles on head capsule, shorter setae around fontanelle.

Pronotum long, numerous setae on margins and disc, front margin almost straight, hind margin more emarginate, sides convex.

Measurements in millimetres : morphotype—range and mean of 26 specimens from 7 localities :

	Morphotype	Range	Mean
Head width across eyes	3·08	2·93–3·32	3·14
Eye major diameter	1·09	0·93–1·15	1·05
Ocellus major diameter	0·46	0·37–0·53	0·45
Ocellus minor diameter	0·35	0·28–0·40	0·35
Ocellus ex eye	0·14	0·12–0·20	0·15
Median length of pronotum	1·59	1·53–1·74	1·66
Maximum width of pronotum	2·91	2·73–3·48	3·09
Length of hind tibia	3·79	3·48–4·58	3·98
Length of fore wing	—	32·00–37·50	33·50
Maximum width of fore wing	—	8·00–9·50	8·90

Major soldier. In addition to the original description (Fuller) : head capsule sometimes very dark ; rather flattened in side view ; frontal depression shallow. Mandibles usually stout, only tip hooked. Pilosity of head capsule conspicuous.

Pronotum not much narrower than head capsule, its front and hind margins distinctly emarginate, sides of the anterior lobes also emarginate. Shape of meso- and metanotum variable, metanotum wider than mesonotum.

Hind tibia short.

Measurements in millimetres : holotype—range and mean of 26 specimens from 13 localities :

	Holotype	Range	Mean
Head length	4·19	4·19–5·48	4·79
Head width	3·10	2·96–3·50	3·28
Head depth inc. gula	2·06	1·92–2·36	2·20
Length of gula	2·96	2·96–3·74	3·34
Maximum width of gula	1·00	1·00–1·33	1·13
Minimum width of gula	0·68	0·62–0·85	0·76
Length of left mandible	2·31	2·08–2·57	2·37
Length of hind tibia	2·52	2·23–2·86	2·59
Maximum length of pronotum	1·33	1·33–1·63	1·49
Maximum width of pronotum	2·44	2·44–3·06	2·79

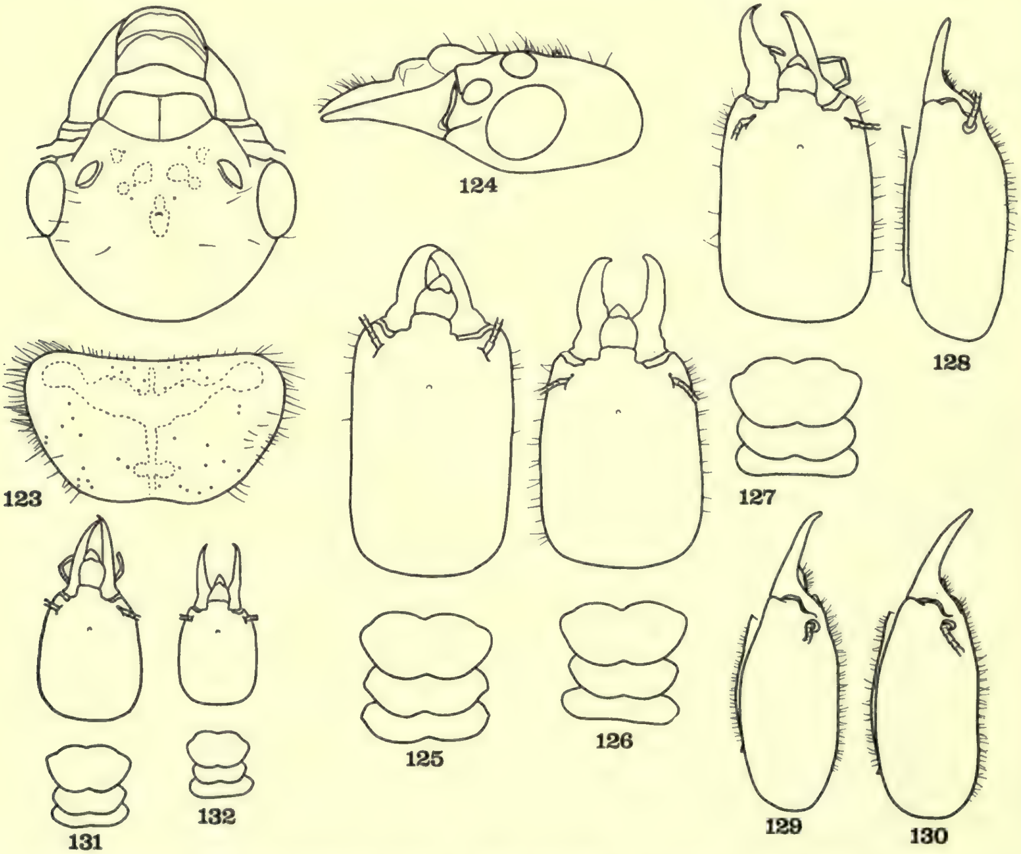
Minor soldier. Additional notes to Fuller's description : Gula same colour as head, sides darker. Antennae sepia brown. Thoracic nota yellowish brown, lighter than head, outline darker. Abdominal sternites lighter than tergites, the latter slightly lighter than thoracic nota.

Head capsule elongate, barely narrowed in front, sides straight.

Measurements (27 specimens from 13 localities) in millimetres :

	Range	Mean
Head length	2·21–3·12	2·48
Head width	1·79–2·34	1·99
Head depth inc. gula	1·17–1·66	1·36
Length of gula	1·38–2·15	1·63
Maximum width of gula	0·62–0·78	0·68
Length of left mandible	1·59–2·08	1·76
Length of hind tibia	1·62–2·31	1·87
Maximum length of pronotum	0·88–1·01	0·94
Maximum width of pronotum	1·43–1·66	1·56

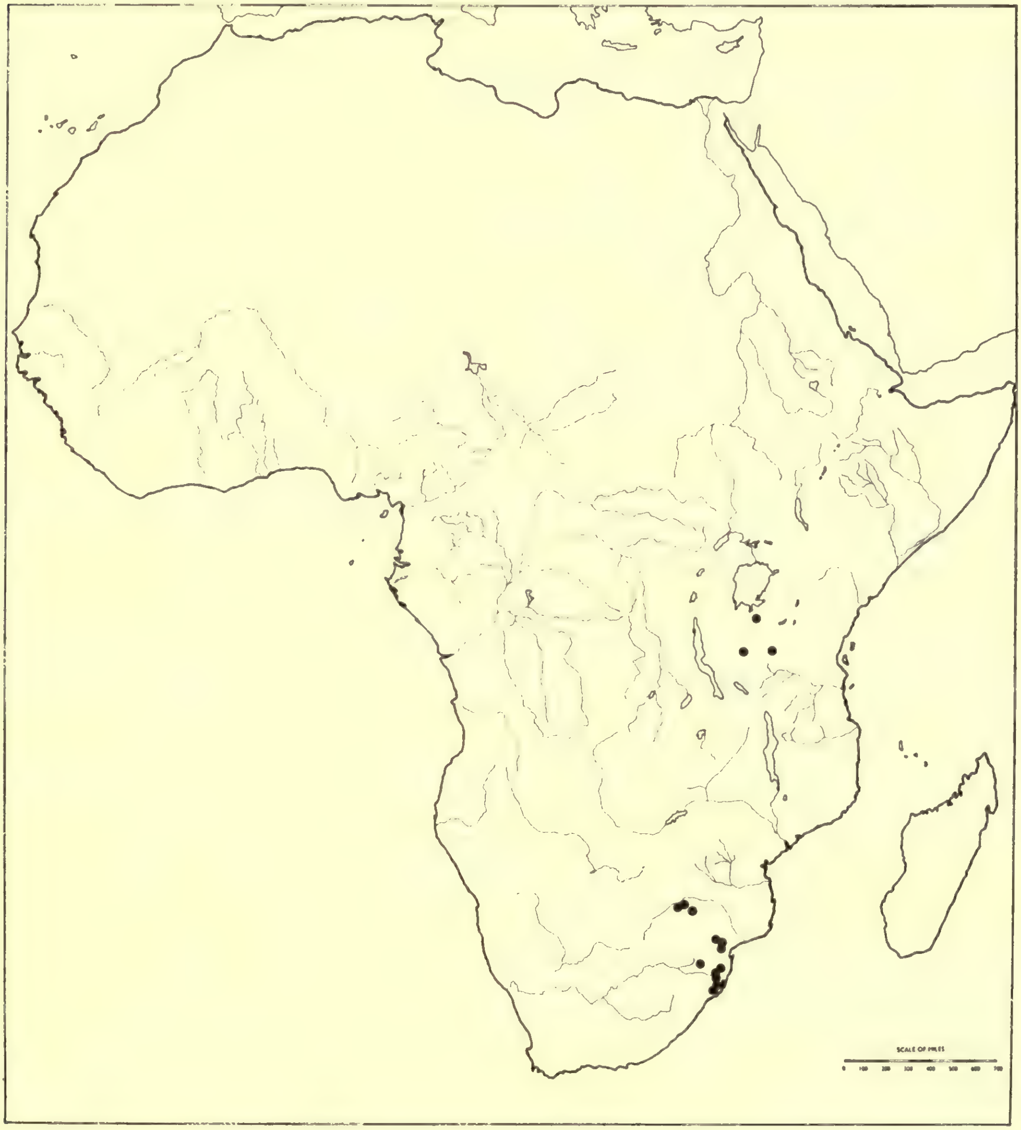
Major worker. Head width (7 specimens from 4 localities) : range 2·09–2·51, mean 2·36 mm.



Figs 123–132. *Macrotermes ukuzii*, imago, soldiers. 123–124. Imago : 123, head capsule and pronotum, plan view (with details of light marks) ; 124, head capsule, side view. 125–130. Major soldier : 125–127, head capsule and thoracic nota, plan view ; 128–130, head capsule, side view. 131–132. Minor soldier, head capsule and thoracic nota, plan view.

Variation. The major soldiers have a strikingly pilose head capsule ; specimens from southern Tanzania, however, do not (see discussion below).

This species is closely related to *M. natalensis*. In the imagos, the postclypeus is more inflated and definitely longer in proportion to its width ; the ocelli are closer to the eyes and these are proportionately bigger ; the median ridge in front of the fontanelle is lower, not higher, than the fontanellar hump. The head capsule of



MAP 11. Collecting localities of *Macrotermes ukuzii*.

the major soldier, apart from its small size, is narrow (index head length/head width close to 1·5, the highest value in the genus) and pilose.

The holotype major soldier of *T. parvus* Holmgren is unusually small, even for *M. ukuzii* ; it agrees, however, with Fuller's specimens and the additional material examined. The probability that all of those nest series would be aberrant samples of a widely distributed species like *M. mossambicus* or *M. natalensis* is not excluded, but is considered too low to prevent recognizing *M. ukuzii* as a distinct species. Hybrids, as Fuller (1927) seems to imply, are also possible, but this is a matter for field study.

Type Material. REPUBLIC OF SOUTH AFRICA : Zululand, no date (*Trâgårdh*), holotype major soldier of *T. parvus* Holmgren, A.M.N.H. Morphotype : Natal : Ndumo, 20.ix.1922 (*Cl. Fuller*), ♂ imago, N.C.I.

Other Material from Natal : Mkuzi R. near Mtanto Drift, 26.vi.1920 (*E. Collins*), type collection of *M. ukuzii* Fuller, N.C.I. and B.M.(N.H.) ; Ndumo, 20.ix.1922, Lower Mkuzi Drift, 11.ix.1923, Somkele (28°20′ S., 32°03′ E.), 4.xi.1924 (*Cl. Fuller*), Hluhluwe, 15.ii.1937 (*C. Jacot-Guillarmod*), Ingwavuma (27°10′ S., 32° E.), 18.xi.1939 (*W. G. H. Coaton*), 28.i.1959 (*J. H. Grobler*), N.C.I. Transvaal : Komatipoort, 10.xi.1958 and 16.xi.1959 (*P. C. Joubert*), Lower Sabie (25°10′ S., 31°54′ E.), 9., Skukuza, 10.xi.1949, Evangelina–Alldays (22°40′ S., 28°55′ E.), 10., Waterpoort–Louis Trichardt, 16., Stolzenfels–Tonash (22° 43′ S., 28°35′ E.), 19.iv.1964 (*W. G. H. Coaton*), N.C.I. ; Eastern Lowveld, no locality, iii.1966 (*D. H. Kistner*), own collection.

SWAZILAND : Mankaiana, 26.x.1960, 3 vials (*W. G. H. C.*), N.C.I.

TANZANIA : Shinyanga, 1931 (*S. N. Bax*), A.M.N.H. ; Kakoma, no date, Itigi, 10.ix.1949 (*P. B. Kemp*), B.M.(N.H.).

A total of 27 nest series were examined.

The identity of the 3 samples from Tanzania is less certain, for reasons of geographical gap, scarce pilosity of head capsule in major soldiers and large size of minor soldiers. Pending further evidence, however, they are assigned to *M. ukuzii.*

From the collecting dates, this species swarms in Transvaal at night, around the middle of November. (*M. natalensis* swarms at the same time, at least in Komatipoort.)

Macrotermes vitrialatus (Sjöstedt)

(Text-figs 133–154 ; Map 12)

Termes vitrialatus Sjöstedt, 1899 : 34. Type-locality : CONGO.

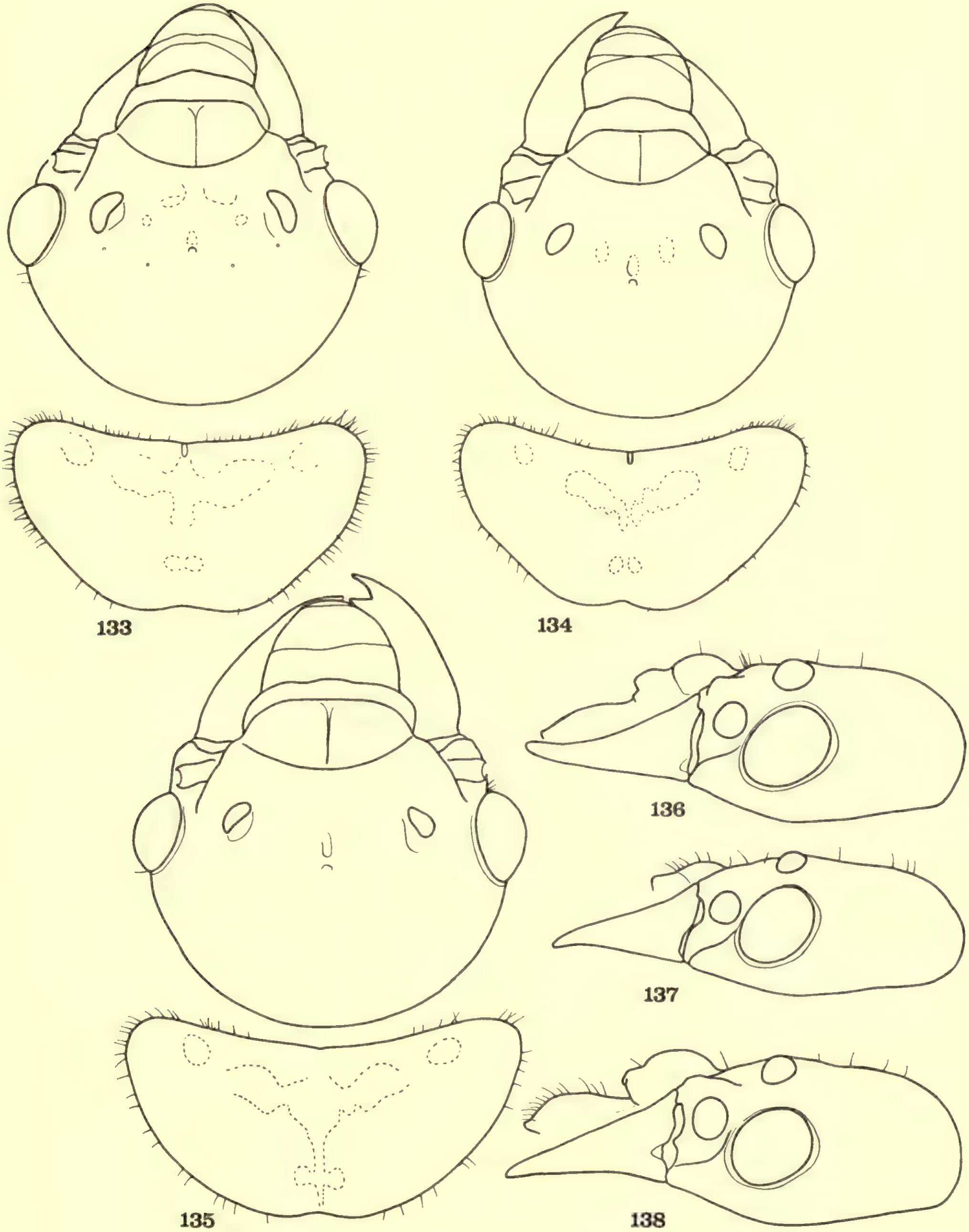
Termes (*Macrotermes*) *vitrialatus* Sjöstedt ; Holmgren, 1912 : 29.

Termes imperator Sjöstedt, 1913 : 359. Type-locality : CONGO, Sankisia, **syn. n.**

Termes waterbergi Fuller, 1915 : 466. Type-locality : REPUBLIC OF SOUTH AFRICA, Warmbad, **syn. n.**

Macrotermes Schoutedeni Sjöstedt, 1924 : 39. Type-locality : CONGO, Banana [not Boma], **syn. n.**

Amplitermes mozambicanus Sjöstedt, 1926 : 89. Type-locality : MOZAMBIQUE, Andrada [neither ' Anodrada '—Sjöstedt—nor ' Anodraba '—Snyder], **syn. n.**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Figs 133–138. *Macrotermes vitrialatus*, imago : 133–135, head capsule and pronotum, plan view (with details of light marks) ; 136–138, head capsule, side view.

Macrotermes angolensis Noirot, 1955 : 142. Type-locality : ANGOLA, Coemba, **syn. n.**

Imago. Head brown to dark chestnut-brown ; postclypeus lighter than head, with dark median line ; base of mandibles as postclypeus, apical third black. Pronotum same colour as head, with two large yellow spots towards the sides in concave depression near front margin, two light dots in the middle on small humps near hind margin. Abdominal tergites brown, sternites more reddish than tergites. Legs yellowish brown, tibiae slightly darker than femora. Wings transparent, veins yellowish to brownish yellow.

Fontanelle an inconspicuous light dot in a very shallow depression, followed anteriorly by a faint median carina. A few scattered bristles on head capsule. Eyes sub-circular, prominent, but small ; ocelli rounded, separated from the eyes by more than their major diameter. Postclypeus in side view moderately prominent. Antennae 19-jointed, 2nd segment equal to 4th, 3rd longer than both.

Width of pronotum twice or more its median length and often superior to head width ; antero-lateral corners broadly rounded, short setae conspicuous on front edge only.

Measurements in millimetres : holotype—range and mean of 39 specimens from 15 localities :

	Holotype	Range	Mean
Head width across eyes	3·92	3·61–4·35	4·05
Eye major diameter	1·07	0·90–1·17	1·03
Ocellus major diameter	0·43	0·33–0·49	0·41
Ocellus minor diameter	0·37	0·22–0·42	0·36
Ocellus ex eye	0·40	0·34–0·60	0·50
Median length of pronotum	1·90	1·61–2·02	1·89
Maximum width of pronotum	3·90	3·25–4·45	4·04
Length of hind tibia	4·84	4·00–5·00	4·57
Length of fore wing	33·50	31·50–40·0	35·50
Maximum width of fore wing	9·00	7·00–9·50	8·40

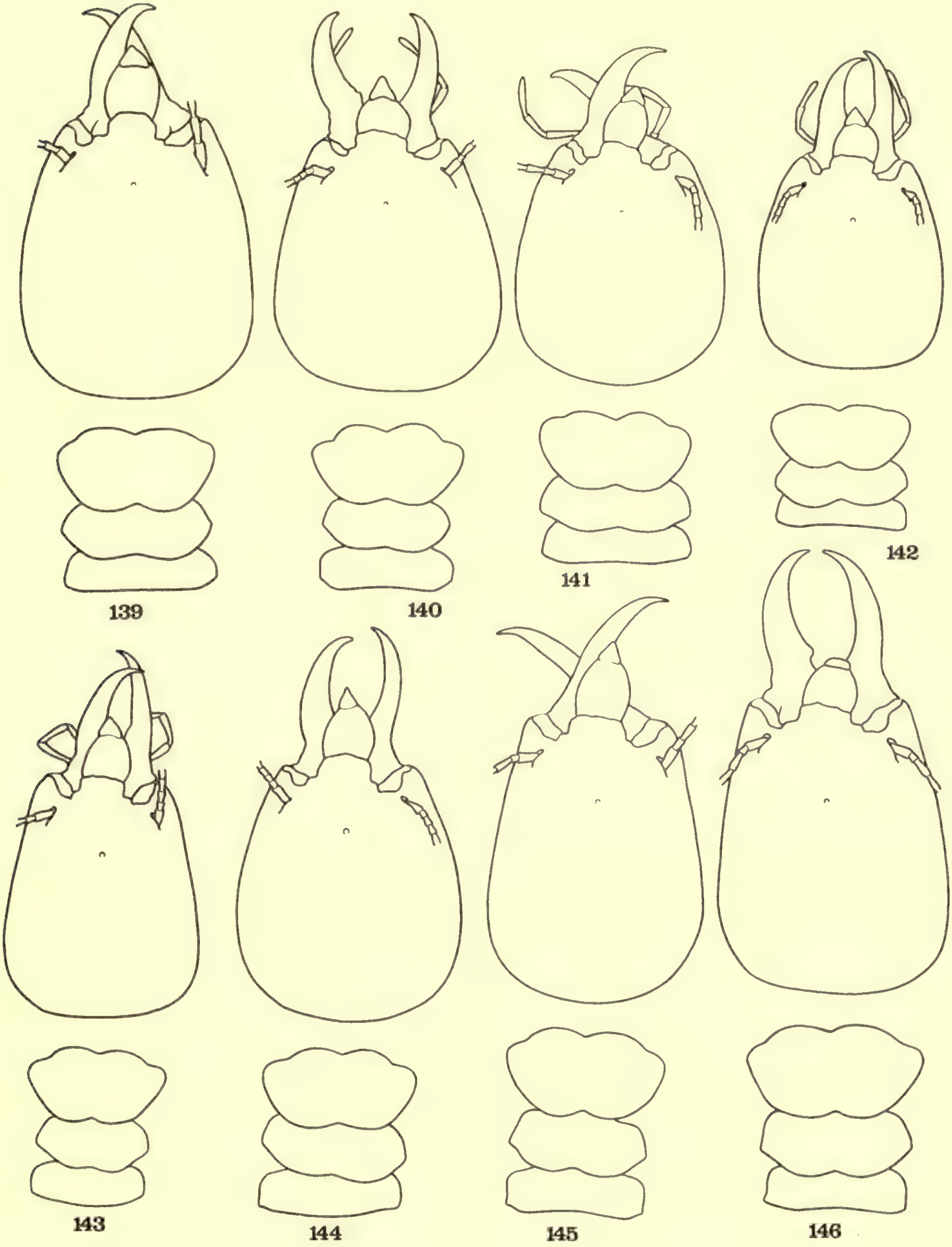
Major soldier. Head reddish yellow to reddish brown, ventral side lighter, gula darker than genae. Mandibles usually black throughout, base sometimes dark reddish brown. Thorax darker than head, especially the outline ; abdominal tergites more often than not lighter than thorax, sternites lighter than tergites ; tibiae usually not darker than femora ; setae darker than cuticle, with light area around base.

Head capsule in plan view trapezoidal to pear-shaped, more or less constricted in front ; frontal area not deeply depressed, but low median ridge following anteriorly the fontanelle, the latter more or less indistinct. Mandibles long, rather evenly incurved, left one a little more than right. Hyaline tip of labrum acute, sides straight to concave. Antennae 17- to 18-jointed ; when 17-, 3rd segment constricted across middle, and longer than twice the 2nd. Pilosity variable, usually sparse.

Pronotum relatively wide, lateral corners rounded, front and hind margin about equally incurved ; mesonotum at times (1 in 3) wider than metanotum, the latter with a typical outline of parallel sides and straight hind margin.

Measurements (138 specimens from 37 localities) in millimetres :

	Range	Mean
Head length	4·00–6·86	5·73
Head width	3·26–5·58	4·73
Head depth inc. gula	2·24–3·68	3·00
Length of gula	2·91–4·39	3·58
Maximum width of gula	1·10–1·52	1·27
Minimum width of gula	0·76–1·07	0·94
Length of left mandible	2·58–4·14	3·37
Length of hind tibia	3·27–5·26	4·12
Maximum length of pronotum	1·46–2·21	1·82
Maximum width of pronotum	2·70–4·14	3·37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FIGS 139–146. *Macrotermes vitrialatus*, major soldier, head capsule and thoracic nota, plan view.

Minor soldier. Head capsule yellowish brown to reddish brown ; gula, at least along the sides, darker than ventral genae ; mandibles dark red ; antennae lighter than head. Thorax as often as not lighter than head, front and hind margins darker. Abdominal tergites same colour as head capsule but without reddish tinge, sternites lighter ; legs same colour as sternites.

Head capsule in plan view ovate-quadrate, fontanelle inconspicuous. Labrum large. Mandibles long and slender, tip incurved. Antennae 17-jointed, 4th segment longer than 3rd. Pilosity sparse, even on abdominal nota.

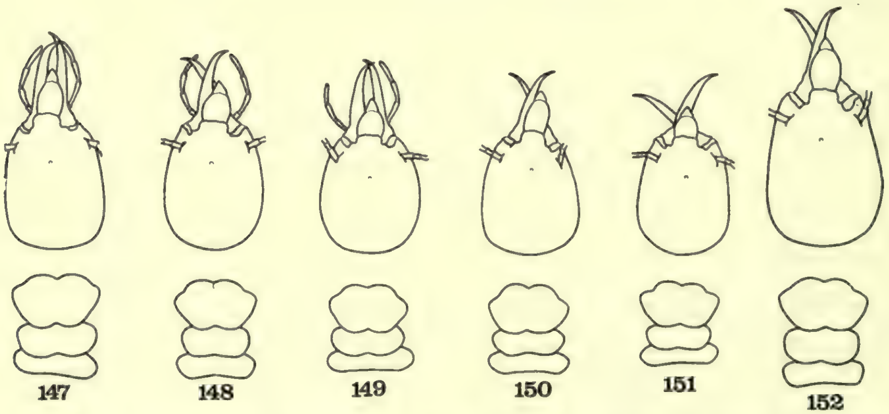
Pronotum with sinuate anterior margin, posterior emarginate ; mesonotum distinctly narrower than both pro- and metanotum.

Measurements (106 specimens from 33 localities) in millimetres :

	Range	Mean
Head length	2·20–3·25	2·62
Head width	1·73–2·73	2·09
Head depth inc. gula	1·08–1·85	1·47
Length of gula	1·39–2·07	1·59
Maximum width of gula	0·63–0·77	0·69
Length of left mandible	1·74–2·36	2·00
Length of hind tibia	2·52–3·42	3·00
Maximum length of pronotum . . .	0·92–1·35	1·06
Maximum width of pronotum . . .	1·51–2·28	1·74

Major worker. Head capsule drab reddish brown, paler between fontanelle and hind margin of postclypeus ; in plan view evenly rounded, widest behind articulation of mandibles. Head width (207 specimens from 24 localities) : range 2·23–3·38, mean 2·69 mm.

Variation. The outline of the head capsule in the major soldier is variable (Text-figs 139–146). Besides a denser pilosity found in some South African specimens, other samples from Western Congo are smaller and more rounded. Still others, from Kwango and adjacent Angola, have a trapezoidal outline with sides nearly straight ; the lateral corners of the pronotum are also more acute and the mandibles less incurved than usual. Imagos are not distinctive to the same extent. However, it is worth noting that native people from northern Angola use different vernacular names for the specimens from Dundo (the usual form, called ' Iungo ') and for those from Camissombo-Capaia and Caluango (this variant, called ' Ikhala '). These observations have been communicated, with some doubts, by a well-known field naturalist (A. de Barros Machado, *in litt.*). It is thus anticipated that a new subspecies may be created when more,



FIGS 147–152. *Macrotermes vitrialatus*, minor soldier, head capsule and thoracic nota, plan view.

and more complete, samples, including all castes and collected in the same locality, will be available. For the time being, the evidence is still considered insufficient.

The following notes are added here to the comparison already made between this species and *M. muelleri* (above) : The imago of *M. vitrialatus* has the smallest eyes in the whole genus : index H/E 3·93 (in *M. muelleri* 3·38, in *M. bellicosus* 2·87) ; the postclypeus also looks relatively longer and slightly more prominent than in *M. muelleri*. The major soldier's head capsule in *M. vitrialatus* is less narrowed in front, the pronotum is proportionately wider and its sides are more rounded than is the case with *M. muelleri*. The gula in the minor soldier is shorter and wider than in *M. nobilis* and *M. muelleri* ; the 3rd antennal joint is longer than the 4th in *muelleri*. (Incidentally, it may be noted that seven of the species redescribed in this work have in the major soldiers a left mandible that averages more than half of the head length : *falciger, herus, ivorensis, lilljeborgi, muelleri, natalensis, vitrialatus*.)

Type Material. CONGO : no locality, ? 1893 (*H. Freyschmidt*), holotype ♂ imago of *T. vitrialatus* Sjöstedt, Hamb. ; Sankisia (9°22′ S., 25°46′ E.), 19.xi.1911 (*Bequaert*), type collection of *T. imperator* Sj., Terv. ; other syntypes in Stockh., A.M.N.H., U. Lov. ; Banana (the label ' Boma ' is a mistake : H. Schouteden, priv. comm.), vii.1920 (*H. Schouteden*), type collection of *M. schoutedeni* Sj., Terv. ; other syntypes in Stockh. and A.M.N.H.

Other Material. CONGO (Brazzaville) : 3 m. fr. Brazzaville on N'Gabé Rd, 2.vii.1959 (*J. E. Ruelle*), U. Lov. and A.M.N.H.

CONGO : Kimwenza (4°30′ S., 15°13′ E.), 6.xi.1959, Mayidi (5°11′ S., 15°09′ E.), 3.vii.1963, 22.i.1964, 4.v.1968, 14 m. fr. Thysville on Matadi Rd, 9.iv.1964 (*J. E. Ruelle*), U. Lov. and B.M.(N.H.) ; Boma, 3.iv., 20.vi.1913 (*Styczynski*), Terv. and Stockh. ; Mukimbungu, 14.xi.1904 (*K. E. Laman*), Stockh. and A.M.N.H. ; Dilolo, no data, Kapanga, ix.1932 (*Overlaet*), Tumbwe, xi.1921 (*M. Bequaert*), Luashi, iii.1936 (*Freyne*), Terv. ; Kinda, no date (*Müller*), Mpese, no date (*Cooreman*), Vista (5°51′ S., 12°17′ E.), no date (*V. Moerenhout*), I.R.S.N. ; Kimbao (5°30′ S., 17°28′ E.), 20.viii.1959 (*J. E. Ruelle*), U. Lov.

ANGOLA : Coemba (12°10′ S., 18°15′ E.), Dundo Acc. No. Ang. 1606, type collection of *M. angolensis* Noirot, (Dundo) ; other syntypes in A.M.N.H., Terv., U. Lov. Other Material : 5 and 9 mi. E. of Dundo, 1961, 2 vials (*Ed. Luna de Carvalho* and *A. de Barros Machado*), Camissombo–Capaia (8°10′ S., 20°40′ E.), 15.ii.1961 (*L. de C.*), Caluango (8°19′ S., 19°52′ E.), 3 and 5.ix.1961, 4 vials (*L. de C.* and *de B. M.*), Dundo.

ZAMBIA : Lusaka, no date (*W. V. Harris*), 2.vii. and 21.xi.1966 (*M. G. Bingham*), B.M.(N.H.), U. Lov., A.M.N.H. ; Chinsi Hills, 16.viii.1949 (*Hope-Simpson*), B.M.(N.H.) ; Choma, 15.i.1957 (*W. G. H. Coaton*), Magoye, 17.i.1957 (*E. N. Cooling*), N.C.I.

MALAWI : 25 m. fr. Kota-Kota on Kasungu Rd, 17., 7 m. fr. Loweya R. on Nkata Bay Rd, 21.ix.1953 (*W. A. Sands* and *W. Wilkinson*), B.M.(N.H.).

SOUTH WEST AFRICA : Otjitambe (Outjo), 14.i.1951 (*F. Gaerdes*), 20 mi. ex Gobabis–Windhoek, 12.iv.1965 (*W. G. H. Coaton*), Katima Mulilo, 30.v.1965

(*A. Barnard*), Ohopoho–Rua Cana Falls, 12.–14.iv., 3 vials, Ohopoho–Ombombo, 1.v., 2 vials, Ombombo–Gauko Otavi, 2.v.1966 (*W. G. H. Coaton, J. L. Sheasby*). Further material from same territory includes 7 nest series from 4 places between 18°–20°15′ S. and 19°45′–20°45′ E., 12.iv. to 1.v.1967 (*W. G. H. C., J. L. S.* and *G. F. Pretorius*), N.C.I.

RHODESIA : Selinde Mt, 19.xii.1928 (*R. Boulton*), B.M.(N.H.) and A.M.N.H. ; Gokwe District, 18.xii.1962 (*M. G. Bingham*), B.M.(N.H.) ; Salisbury, no dates, 2 vials (*Marshall*), Stockh. ; Matsikite (16°20′ S., 29°47′ E.), Chenanga (16°29′ S., 30°14′ E.), x.1965, Matopos, 23.xi. and 5.xii.1965 (*M. G. Bingham*), U. Lov.

MOZAMBIQUE : Andrada, 1905 (*G. Vasse*), type collection of *Amplitermes mozambicanus* Sj., (Muséum Paris), syntypes in Stockh. and A.M.N.H.

REPUBLIC OF SOUTH AFRICA : Transvaal : Warmbad, 14.x.1914 (*Simmons*), type collection of *M. waterbergi* Fuller, N.C.I. ; paratypes from De Wildt (25°39′ S., 27°57′ E.), 14.x.1914 to iv.1919, 4 vials (*Cl. Fuller*), N.C.I. and B.M.(N.H.). Other Material : Rus De Winter (25°12′ S., 28°28′ E.), 12. and 24.ix.1957 (*P. C. Joubert*), 13.iii.1963 (*J. L. Sheasby*), N.C.I., U. Lov., A.M.N.H. ; Rustenburg–Boshoek, 1., Vaalwater, 27.ix.1961 (*W. G. H. Coaton*), Northam–Middelwit, 4.x.1961, Maraheki–Warmbad, 26.iv.1964 (*J. L. Sheasby*), N.C.I. and U. Lov. ; Nylstroom, 16.ix.1918 (*Cl. Fuller*), Hammanskraal, 12.viii., 20.ix.1963, 6., 28., 30.i.1964 (*J. L. Sheasby*), N.C.I.

A total of 89 nest series were examined.

This species was described under six different names from 1899 to 1955 ; in the collections, some samples had been identified as *M. natalensis* and one other misidentification should be quoted here (Sjöstedt, 1911 : 143 ; '*Termes bellicosus*').

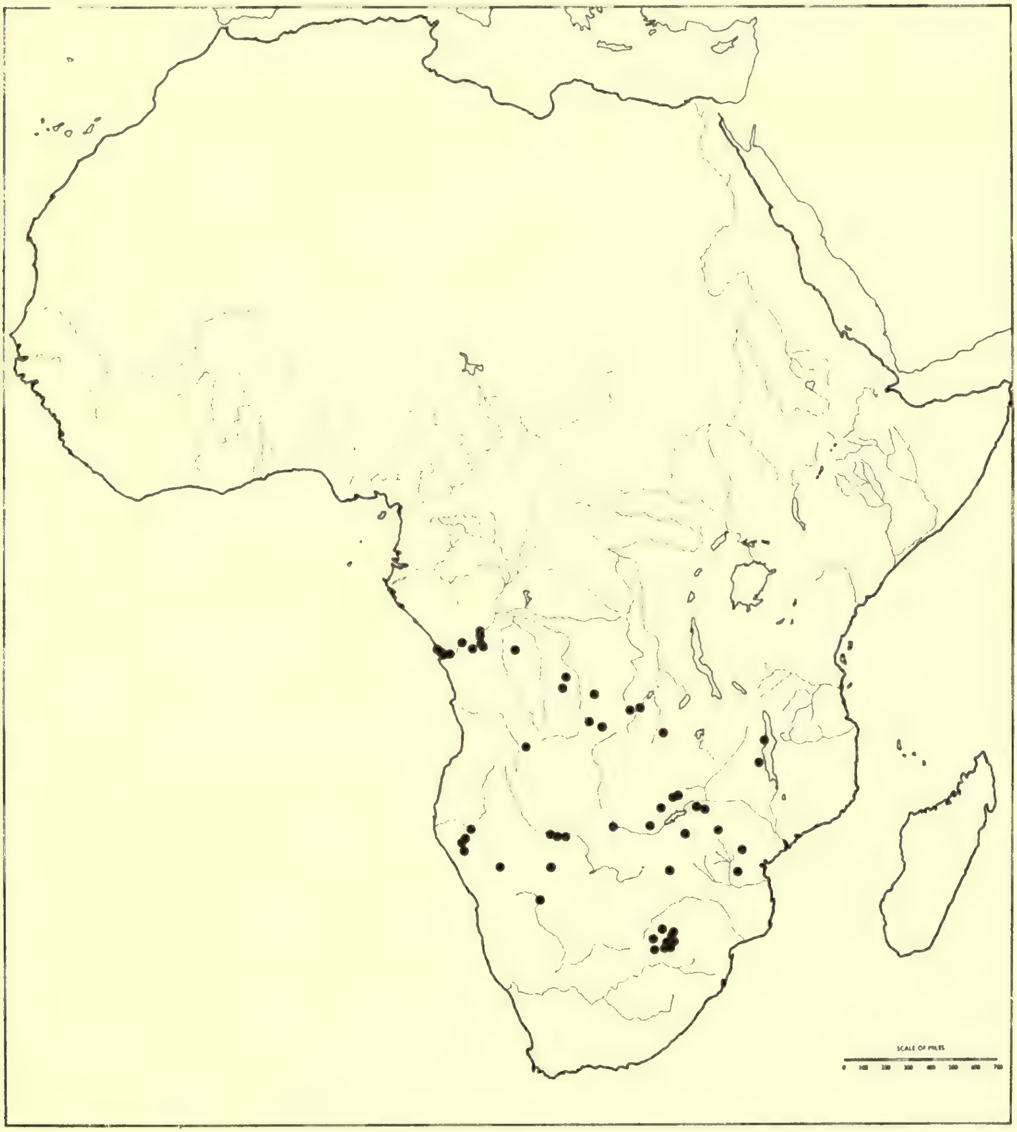
The case of *T. imperator* parallels that of *T. carboniceps* with samples of unusually large soldiers. (At the lower range we have here *M. angolensis*.) *T. vitrialatus* and *A. mozambicanus* were first represented by alates only and collected far apart. It may be noted that *M. schoutedeni* had already been considered as a synonym of *M. vitrialatus* before this revision was undertaken (A. E. Emerson, private communication). As regards *M. waterbergi*, sufficient evidence has been gathered from Transvaal and Rhodesia since Fuller's time to leave little doubt about its status, in spite of its somewhat more conspicuous pilosity. The specimens from some parts of Angola have been discussed above.

M. vitrialatus may be more abundant than it looks from the distribution map ; its nests indeed are often inconspicuous, even completely subterranean. They are aptly described by Fuller (1921, 26) as mounds ' of loose soil, not unlike that of new grave ' : this has been confirmed since in South Africa and Angola (Coaton, de Barros Machado, *in litt.*) as well as in the Congo, near Kinshasa. Harder hummocks do occur, however, on more clayey soils, e.g. the region around Thysville. (The fig. 3 in Noirot, 1955 : 144, which looks like a nest of *M. bellicosus*, could unfortunately not be checked by redetermination of the sample.)

Although this is not a forest species, its major workers cut leaf fragments in a fashion similar to that observed with *M. muelleri*, as has already been noted. Reports from South Africa and Rhodesia (Coaton, Bingham, *in litt.*) agree with the observations made in the Congo.

The foraging behaviour in broad daylight, as observed with the type collection of *T. imperator,* has also been observed near Kinshasa ; according to Bingham and Coaton, it further occurs with *M. falciger* in Rhodesia and South Africa. This ethological trait is not, therefore, a characteristic of the forest *Macrotermes.*

The evidence available suggests that *M. vitrialatus,* unlike other *Macrotermes,* does not swarm at the onset of the rainy season (alates have been collected towards the end of it, in the Congo) ; as far as is known, the imagos would take off immediately after dark rather than in the morning.



MAP 12. Collecting localities of *Macrotermes vitrialatus.*

ADDENDUM : DOUBTFUL PLACES

It has proved impossible to trace some localities on the maps available. Those which have not been cited in this work as : X. (co-ordinates unknown) are listed below with the species concerned and the place of deposit. Vague indications such as ' Kafferlandet ', ' Deutsch Ost-Afrika ' and the like—including 33 nest series—have been omitted altogether (save for the type specimens).

ETHIOPIA. *M. subhyalinus* : Lake Hora Harsadi, ? 1927 (*collector unknown*), B.M.(N.H.) ; Katchinoa, Yaba, no dates (*Rothschild*), Stockh.

CONGO. *M. subhyalinus* : Tarambo (*Lang-Chapin* coll. No. 1528), A.M.N.H.

MALAWI. *M. vitrialatus* : Kasu, iii.1916 (*J. B. Davey*), B.M.(N.H.).

ACKNOWLEDGEMENTS

First of all I thank Prof. Albert Bouillon, of the Lovanium University, Kinshasa, for starting my interest in *Macrotermes* early in 1959 and for providing all kinds of facilities—including financial support—throughout this study.

Next I wish to express my gratitude to Dr W. V. Harris, Officer-in-Charge, Termite Research Unit, British Museum (Natural History), for access to the London and Cambridge collections since 1962, not less than for helpful advice and encouragement ; to Mr W. A. Sands, of the same unit, I owe much of the enlightening remarks and constructive criticism in the preparation of this revision.

My special thanks go to Dr A. E. Emerson for liberal communication of his long experience and unique collection of data on termites as well as for his hospitality at home ; in the same year (1967) I enjoyed staying at the American Museum of Natural History, New York, with all the facilities generously provided by Jerome G. Rozen Jr., Curator of the Department of Entomology, and especially with the warm helpfulness of Dr Kumar Krishna.

Among other curators, Dr P. Basilewsky, Department of Entomology, Musée Royal de l'Afrique Centrale, Tervuren, should have been mentioned first ; for he not only welcomed me to work on his rich termite collections in 1965, but at the same time enabled me to borrow, thanks to the kindness of Dr E. Kjellander, Stockholm and of Dr H. Weidner, Hamburg, the all-important collections kept in the latter institutions. Special circumstances (my usual residence in the Congo) made the sojourn at Tervuren the more valuable.

In spite of the insecurity attributed to the same Congo, Dr W. G. H. Coaton, of the Plant Protection Research Institute, Pretoria, did not hesitate to send to Kinshasa the bulk of the N.C.I. collections, of which many specimens have been donated by him to Lovanium University ; this, and the useful collecting notes he added, well deserve a detailed acknowledgement.

Dr Cooreman, Institut Royal des Sciences Naturelles, Bruxelles, and Prof. C. Noirot, Faculté des Sciences, Université de Dijon, have helped me in providing access to, and in sending samples from, their invaluable accessions. To Prof. Noirot I will add Messrs A. de Barros Machado and M. G. Bingham, when it comes to acknowledging not only the liberal communication of samples, but also the very interesting field notes gathered by experienced observers in parts of Africa that I was

unable to visit myself. I am also grateful to Drs J. Deligne, D. H. Kistner, and J. M. Pasteels for their collections ; not to forget the help received at Basel from Dr Eb. Ernst.

Finally, my thanks are due to Miss M. Van Hove for help with the drawings and the distribution maps, and to other people working in the laboratory of Prof. A. Bouillon.

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